THE WAR AGAINST CONSUMPTION

THE CONFERENCE OF 1901

BY DENNIS VINRACE

S.L.

Press Notices.

BRITISH MEDICAL JOURNAL:—"We believe the book will prove of value to the very large number of persons who are engaged in public work as members of municipal bodies, or other authorities dealing with sanitary matters, also to heads of households. It contains much of the best thinking and best teaching available on the subject in a form suitable for immediate assimilation."

THE LANCET:—"We wish the book a wide circulation, for it is certainly suitable for general reading, and can be understood by all. . . . We believe the information to be accurate and sound . . . . and we think that the chapter on the Open Air Sanitorium is excellent."

MEDICAL PRESS AND CIRCULAR:—"Will amply repay the careful reader. . . . The writers manage to give a short note of every matter of consequence that came before the late Congress, so that anyone wanting to be posted up in recent researches on tuberculosis will find this a most useful work."

THE MORNING POST:—"The contents are not written in an unduly scientific style, and will be readily followed by any intelligent reader."

THE HOSPITAL:—"A very useful summary. . . . Should prove a valuable guide and help to all who are willing to co-operate actively in the campaign against Consumption."

THE MEDICAL TIMES:—"The book is well designed . . . and may serve a useful purpose in spreading important information and arousing practical interest in what has long been recognised as a national sorrow, and is now known to be an Imperial danger."

THE DAILY NEWS (in a leading article):—"Mr. Dennis Vinrace's volume, 'The War against Consumption,' gives an account of the proceedings (of the Congress), lucidly arranged, and not embarrassed by too much technical language, which is likely to prove of great use to the public."

THE DAILY MAIL:—"A timely publication. It is in reality a popular hand-book of the proceedings of the British Conference on Tuberculosis, and is a most excellent and lucid summary of the whole of our knowledge on the subject at the present time."

THE SPEAKER (in a leading article):—"The report of the Congress is not yet given to us. But anyone who would follow in outline the proceedings, and grasp the sense of the papers read, may turn to a little book by Mr. Dennis Vinrace, called 'The War against Consumption,' lately published, which gives a very clear account of what was said, and of the conclusions arrived at."

DAILY CHRONICLE:—"This little volume ought to provide much food for reflection, and can be warmly recommended to those for whom it has been specially written, namely, members of Municipal bodies, or other authorities dealing with sanitary matters. . . . The work of both the compiler and reviser has been very well done."

MORNING LEADER:—"Dr. Vinrace has done a great service by issuing a summary of the proceedings written in a popular form. Avoiding as far as possible the use of technical terms, he has set down the chief contributions to our knowledge on this important subject which the Congress produced, and in an important chapter he gives in brief the chief lessons to be derived from these."

THE WESTMINSTER REVIEW:—"Will be welcome to many. . . . The book will probably be useful to Municipal authorities and their sanitary officials, as well as to that section of the public which is most interested in questions concerning tuberculosis."

THE ST. JAMES'S GAZETTE:—"A clear and comprehensive hand-book."

THE GLASGOW HERALD, Feb. 4th, 1902:—"This little book is one which we cordially recommend to the reader as a concise, thorough, and readable composition on a most important subject, of which no one can afford to be in ignorance."

THE MANCHESTER COURIER, Feb. 5th, 1902:—"Dr. Vinrace has attempted to give, briefly and in popular language, the results of the labour, thought and experience of those who have studied the subject most deeply, and it is impossible to praise too highly the way in which he has carried out the task. . . . A wide circulation of this authoritative and most interestingly written book will do an enormous amount of good."

SCOTSMAN:—"A useful and well digested account of the Congress. Both medical men and lay readers will welcome it."

THE COUNCILLOR AND GUARDIAN:—"The language employed, whilst being sufficiently popular to render the matter intelligible to educated but non-scientific readers, preserves sufficient of the scientific terminology to ensure accuracy. It will be seen, therefore, that it is peculiarly adapted for the use of the members of the sanitary authorities, Boards of Guardians and other public bodies."

LOCAL GOVERNMENT JOURNAL:—"A study of this book ought to be the means of saving many a life."

THE BIRMINGHAM MEDICAL REVIEW:—"We are glad to congratulate Dr. Vinrace on having carried out his purpose in very excellent style."

BIRMINGHAM DAILY GAZETTE:—"Dr. Vinrace's book affords much food for reflection, and is especially to be recommended to those for whom it is designed—'members of municipal bodies or other authorities dealing with sanitary matters.'"

MIDLAND COUNTIES HERALD:—"There are many who will welcome the volume, which forms a very readable and intelligible résumé of the Conference proceedings. . . . . The work has had the advantage of revision by Dr. J. H. Vinrace."

A copy of the book has been graciously accepted by His Majesty the King.

THE WAR AGAINST CONSUMPTION.

A POPULAR HANDBOOK
TO THE BRITISH CONGRESS ON
TUBERCULOSIS.
1901.

SECOND EDITION

A

Digitized by the Internet Archive
in 2015

https://archive.org/details/b24991879

THE
War Against Consumption

A POPULAR HANDBOOK OF THE PROCEEDINGS OF THE BRITISH CONGRESS ON TUBERCULOSIS, HELD IN LONDON, 1901.

BY

DENNIS VINRACE,

M.R.C.S., L.S.A., ENG.

Councillor of the Royal Borough of Kensington; Hon. Surgeon to the
Chelsea, Brompton, and Belgrave Dispensary: formerly
Resident Medical Officer to the Throat
and Ear Hospital, Golden
Square, London,
etc., etc.

REVISED BY

JOHN H. VINRACE,

M.B., LOND.; M.R.C.P., LOND.

Late Assistant Resident Medical Officer to the Brompton Hospital for
Consumption, Physician and Lecturer to St. John's Hospital
for Diseases of the Skin, Physician to the National
Hospital for Diseases of the Heart, etc.

COLLEGE OF PHYSICIANS

SECOND EDITION.

301

[All Rights Reserved.]

Protected from Translation into Foreign Languages.

PRINTED AND PUBLISHED BY THE CENTURY PRINTING CO., LTD.,
19 AND 20, FETTER LANE, LONDON, E.C.
1902.

2

ROYAL COLLEGE OF PHYSICIANS
LIBRARY
CLASS 616-002.5
ACCN. 25124
SOURCE
DATE

TO MY FATHER,

WHO FOR MANY YEARS HAS OCCUPIED A PROMINENT AND
RESPECTED POSITION AMONG THE MEDICAL
PROFESSION IN BIRMINGHAM,
THIS LITTLE VOLUME
IS AFFECTIONATELY DEDICATED BY HIS SON,

THE AUTHOR.

CONTENTS.

CHAPTER. PAGE

PREFACE BY DR. J. H. VINRACE: The Desirability of Treating Tuberculous Patients in English Sanatoria ... 9

AUTHOR'S PREFACE 11

I. Historical Outline of the Knowledge and Treatment of Phthisis 13

II. The Influence of Heredity 20

III. Infection from Tuberculous Sputum ... 29

IV. Alcoholism and Consumption 38

V. The Prevalence and Distribution of Consumption 45

VI. The Importance of the Early Treatment of Consumption 50

VII. The Notification of Consumption... ... 57

VIII. The Infectivity of Dust 68

IX. The Disinfection of Infected Houses ... 73

X. The Influence of Climate 78

XI. The Dieting of Consumptives 81

XII. Lighting and Ventilation 87

XIII. The French Anti-Tubercular Dispensaries 96

CONTENTS—*continued.*

CHAPTER. PAGE.

XIV. German Workmen's Insurance and Consumption 101

XV. Sanatoria and the Open-Air Treatment ... 106

XVI. The Use of Drugs in the Treatment of Consumption — Persodine (Persulphate of Soda), Cacodylate of Guaiacol, Intratracheal Injections of Izal, Urea, Formic Aldehyde 114

XVII. The Value of Röntgen Rays in Diagnosing Phthisis 125

XVIII. The Relation between Human and Bovine Tuberculosis 129

XIX. The Relation between Human and Bovine Tuberculosis—(*continued*) 135

XX. The Character and Causes of Bovine Tuberculosis 140

XXI. Tuberculin as a Test for Bovine Tuberculosis 145

XXII. Existing Regulations against the Sale of Tuberculous Milk 148

XXIII. Existing Regulations against the Sale of Tuberculous Milk—(*continued)* ... 156

XXIV. Existing Regulations against the Sale of Tuberculous Meat 162

XXV. The Use of Tuberculin in Human Tuberculosis 168

XXVI. The Lessons of the Congress 177

88, Gower Street,
Bedford Square,
W.C.

I have had pleasure in revising the pages of this handbook to the British Conference on Consumption. As the reader will appreciate, it is not written in an unduly scientific style, but it is, I believe, an accurate and lucid guide to the proceedings of this very important gathering, and, as such, it should, I think, be of some public utility in assisting to a more general comprehension of the nature of the disease, and the methods by which its ravages may be arrested.

Perhaps, as one who has had some considerable experience in the treatment of consumption, I may be allowed to take advantage of this opportunity to say a word on the very prevalent practice of sending patients to obtain sanatorium treatment abroad. It has long been the custom for consumptives, whose means allowed them to do so, to betake themselves to Switzerland, South Africa, or other parts of the globe, in the hope of thereby regaining their health. Indeed, it seems to be widely believed that it is only by self-imposed exile of this kind that a consumptive can hope for recovery. I, therefore, wish to point out that this assumption is altogether without foundation. There is absolutely no reason whatever why patients should not undergo sanatorium treatment with quite equal prospects of success in our own country, especially in the equable climate of the Southern Coast. I may go further, and assert, without fear of contradiction, that in a very large proportion of cases it is greatly to the patient's advantage to be treated here, rather than in some foreign land. In but too many instances consumptives are most injuriously affected by the discomfort and fatigue involved in a lengthy journey abroad, and the transition to an unaccustomed climate is often productive of far more harm than good. The enforced separation from friends and relatives is also apt to induce a feeling of depression, which greatly reduces the chances of a cure.

J. H. VINRACE.

November, 1901.

AUTHOR'S PREFACE.

As the British Conference on Tuberculosis, held in London during the latter part of July this year, formed the medium for the expression of the latest views of many of the principal experts of the world on the burning question as to the best methods of carrying on the great international warfare against one of the most terrible diseases which afflict mankind, it has occurred to me that a small handbook, giving in popular language a *resumé* of the proceedings of the Conference, and of the opinions given utterance to in the more important of the papers contributed to the various Sections, might prove of service in propagating among the general public more accurate information concerning the present state of medical knowledge as to the origin and treatment of the disease, and, more especially, the means by which the dissemination of the infection can be effectively checked.

It is, in particular, my earnest desire that the information I have here brought together may prove of value to the very large number of persons who are engaged in public work as members of municipal bodies, or other authorities dealing with sanitary matters, and, as a medical man who has for many years had experience of public sanitation, and who had the honour of being appointed a delegate to the Conference by the Kensington Royal Borough Council, I trust I am not presumptuous in thus endeavouring to afford some measure of assistance to others who are occupied in the great task of ameliorating the hygienic conditions of the community.

In conclusion, I may point out that perhaps the conviction most universally expressed by speakers at the Conference was that it is in the dissemination among all classes of the public of a correct knowledge of the causes of consumption, and of the means by which it may be averted, that the best hope of eventually stamping out this deadly scourge is to be found, and I may express the aspiration that this booklet may in some little degree aid the general public to obtain clear and accurate information on this all-important subject.

I should add that, in the preparation of this volume, I have had, as is acknowledged on the title-page, the valuable co-operation of Dr. J. H. Vinrace, who was formerly Assistant Resident Medical Officer at the Brompton Hospital for Consumption, and whose long study and experience of the treatment of that disease, then and subsequently, have proved of the greatest assistance in the accomplishment of my task.

Dennis Vinrace.

24, Alexander Square, Brompton, S.W.
November, 1901.

THE
WAR AGAINST CONSUMPTION.

CHAPTER I.

Historical Outline of the Knowledge and Treatment of Phthisis.

IN order that my readers may be in a better position for appreciating the various theories or discoveries put forward in the course of the Conference, and to enable them to fully appreciate the great advances both in knowledge of the origin of phthisis and in the treatment of this disease which have been made of late years, it may be of service if I give a very brief historical sketch of the progress gradually achieved in ascertaining the sources of, and the methods of combating, this great scourge of mankind.

The word phthisis, which in itself constitutes an admirable summing up of the terrible effects of the disease, is derived from a Greek verb signifying to grow lean, or waste away.

In even the very early days of the history of medicine physicians had a good and thorough knowledge of the symptoms by which the existence of the disease might be detected, and also of the various stages through which its unfortunate victims had to pass. Indeed, it is obvious that the malady has been the object of the closest and most studious observation for many centuries past. Excellently, however, as the old-time doctors were able to diagnose the existence of the disease, they had little if any knowledge of its real character and origin. Generally speaking, they were apt to take symptoms such as hæmorrhage of the lungs as being causes, instead of simply effects, of the disease. It was also almost universally held, indeed up to quite recent times, that hereditary transmission was the chief direct source of the malady. There was likewise a widely-held belief that it often originated in a bad cold on the lungs. It must be admitted, however, that even several centuries ago there existed in several quarters a more accurate insight into the manner by which the disease was spread abroad. The influence of personal contagion was for long believed in by large numbers of people, although by the commencement of last century this suggestion had been largely discarded, except in Italy, where it has always widely prevailed. Perhaps the first really great advance towards a more accurate knowledge of the complaint was achieved by Laennec's discovery, in the early years of the nineteenth century, of the stethoscope, by means of which much more minute observation in cases of disease of the chest was rendered possible. It was this same distinguished physician to whom we owe the discovery that pulmonary phthisis depends on the development of tubercles in the lungs, and that these tubercles, after undergoing various changes, eventually break down, and so lead to the formation of cavities in these organs. He likewise showed that a similar development of tubercles also affected various other organs of the body, that is to say, that consumption, or tuberculosis, was not a disease which is confined to the lungs, as had hitherto been largely supposed. Perhaps it may be as well to explain, for the benefit of the lay reader, that tubercles are small, round nodules, frequently, in the first instance, about the size of millet seeds.

These theories of Laennec are, speaking roughly, accepted as correct, as far as they go, up to the present day; but, of course, they still left unsolved the all-important question, What was the origin and cause of the tubercles themselves? That great problem exercised the minds of many scientists during the latter half of last century, until, eventually, in 1882, an answer was arrived at which has commended itself to practically the whole medical world.

Before, however, giving a description of the theory which was then propounded, I shall probably make the matter more intelligible to non-scientific readers if I give a short account of the steps which led up to this great discovery,

The microscopic, one-celled organisms, belonging to the lowest known form of life, which are termed bacteria, microbes, and by various other names, have been an object of interest to scientists for over 200 years. As far back as the seventeenth century, drawings of bacteria were made by Leewenhoek, and in 1773 Müller gave particulars concerning certain important forms of these seemingly insignificant organisms. By 1833, indeed, a sufficient number of distinct forms had been discovered to enable Ehrenberg to commence the work of classification. Five years later he had succeeded in establishing the existence of four *genera*, comprising sixteen distinct species. But up to 1853, when Cohn commenced a series of investigations which extended over twenty years, practically nothing was known of their importance in relation to animal and human life. A great advance was made in 1857, when Pasteur finally established that they were the causes of fermentation and putrefaction. About the same time, at the suggestion of Nageli, it was decided to group all the one-celled organisms which multiply by repeatedly dividing into two into one Order, to be known as that of the Schizomycetes. Not long after, the gradually growing suspicion that these organisms might have an intimate connection with various human and animal, notably bovine, diseases, became greatly strengthened by a large number of striking experiments, notably those of Cohn, who has already been mentioned. It was gradually established that these bacteria, which have been divided into three great groups according to their shapes—micrococci, i.e., those of spherical form; bacilli, i.e., the rod-shaped ones; and filamenta. i.e.. the thread-like organisms—exist almost universally in the blood and various organs both of animals and men, being conveyed thither in various ways; and that, although a large number of these parasites are perfectly harmless, others are a fertile cause of infectious maladies. By 1870, indeed, the germ theory of disease, as it was termed, had become generally accepted, the strongest confirmation being forthcoming six years later, when the great German biologist, Professor Koch, who was perhaps the most prominent figure at the Conference with which we are dealing, clearly demonstrated that he had discovered the anthrax bacillus. Since then the existence of many other kinds of pathogenous, i.e., disease producing, Schizomycetes has been shown, notably the germs of typhoid, diphtheria, and lock-jaw. But, for our present purpose, the great epoch-marking event was the discovery by Professor Koch of the bacillus of tuberculosis, or, in other words, the originating cause of the tubercles which have been referred to above as being responsible for the malady known as phthisis or consumption.

The source of the disease thus known, it became for the first time possible to set about the search for a remedy, and for means of checking the spread of the disease, with some prospect of success.

To take first the question of preventive measures, in which direction, up to the present, the greater measure of success has probably been achieved. It will at once be seen that the fact of its having been established that consumption is caused by the introduction into the body, by means of the breath, or in food, of a microscopic parasite, necessarily revolutionised the greater part of the then prevalent ideas as to the best modes both of treating and preventing the disease. It became evident, that, though a constitution affording special facilities for the deadly work of the tubercle bacilli might be inherited from one's parents, the introduction of the disease into the system was a result of infection, and not of heredity, or of getting a bad cold on the lungs, although the latter, again, might, of course, render the lungs specially susceptible to the attacks of the bacilli. From these considerations it soon became apparent that the work of checking the spread of consumption could best be carried on in the following two main directions:—

1. By taking precautions to prevent, so far as possible, the entry of tubercle bacilli into the human body.

2. By teaching people to keep themselves in such a state of health that their systems will be able to resist the ravages of the bacilli, if they gain admittance, for it must be understood that, generally speaking, the parasites are only able to do serious mischief in the case of organs which are already weak or ailing.

With regard to the first, it is generally recognised that three of the principal sources of infection are the inhalation of germs from the dried sputum of tuberculous persons, the inhalation of dust containing tubercle bacilli, and the consumption of tuberculous milk and meat. It is also known that the bacilli do not take kindly to sunshine and fresh air. On these facts most of the preventive measures of recent years have been based, and to the perfection and extension of these measures the efforts of the Conference, as will be seen from the summaries of the proceedings given hereafter, were very largely devoted.

With regard to the question of treatment, it may be said, in the first instance, that the older systems have been largely revolutionised. The long prevalent idea of coddling up a consumptive patient, or a person who is thought susceptible to the complaint, by wrapping him up in heavy clothes, keeping him in a hot-house atmosphere, and jealously guarding him against exposure to the fresh air, is now recognised as the antithesis of the proper mode of treatment. Plenty of sunlight, and pure, fresh air, abundance of good food, and dwelling rooms kept scrupulously clean and free from dust are now considered to be the great essential points, together with suitable climatic conditions, which latter are apt to vary according to the individuality of the patient. Hence there has sprung up in every civilised country a demand for properly equipped sanatoria in which the above-named conditions may be adequately fulfilled. Innumerable special systems of treatment, by means of drugs, massage, etc., have, of course, also been devised, but to these it is not necessary to here refer, as the principal ones will be alluded to in the course of my *resumé* of the Conference's proceedings.

Perhaps, however, before I conclude, I ought to say a word on a subject of great importance, and as to which a good deal of misconception appears to prevail. I refer to Professor Koch's discovery, in 1889, of the preparation now know as tuberculin.

As soon as the existence of disease-producing bacteria became definitely ascertained, biologists naturally directed their attention to means by which these parasitic pests might be destroyed in the human or animal organism, and the system rendered insusceptible to their attacks. It was soon found that, if a certain number of generations of bacilli were cultivated in gelatine or paste, or any other suitable medium, they tended to lose their virulence, and that animals inoculated with these cultivated bacilli showed immunity from disease when subsequently inoculated with the deadly uncultivated germs. It was by working on similar principles to these that Dr. Koch produced the celebrated serum or lymph which was, unfortunately, too rashly hailed as being an absolute cure for consumption. If Dr. Koch ever himself made such a claim for his serum, he has long since abandoned it, although he still claims—and in this he is supported by numerous Continental scientists—that the preparation effects a large percentage of cures in early stages of the disease. However this may be, there is no doubt that in another direction Dr. Koch's discovery was of great public importance. If tuberculin will not cure tuberculosis, it will, at least, generally speaking, reveal the presence of the disease. It has been little used for this purpose in the case of man, but, on the other hand, it is, as is well known, extensively, and, on the whole, very successfully, used for the detection of the disease in cattle. Strange to say, Dr. Koch's latest theory, which is fully dealt with in another chapter, would, if generally accepted, largely destroy the utility of his own previous discovery of the action of tuberculin; for there would be less necessity for detecting the presence of tuberculosis in cattle, if it was established that the disease is not communicable from cattle to man.

CHAPTER II.

The Influence of Heredity.

IN days not yet far distant, heredity was regarded as, if not the sole, at any rate the main factor in the transmission of pulmonary tuberculosis. Certain families gained the reputation of being doomed by destiny to the ravages of consumption, and their unfortunate members, even when not themselves victims to the disease, too often found themselves shut out, by popular prejudice, from the married state. The idea, indeed, appears to have remarkable tenacity, for even to-day the belief that the direct transmission of consumption by means of heredity is of constant occurrence is very widely held. It is only a year or two ago, for instance, that there appeared a very able novel, which enjoyed a large circulation, the main feature of which was the tragic fate of two lovers in whose families the disease had prevailed, who killed themselves, shortly after marriage, in order to avoid handing the curse down to another generation. It should be added that the writer of the book in question evidently considered that suicide under such conditions was an eminently wise and righteous act. Of course, if at a time when there was universal belief in frequent direct hereditary transmission, there had also prevailed correct ideas as to the manner in which the development of the disease might be checked, the generally accepted opinion, however erroneous, might have been productive of more good than harm, inasmuch as the large section of the population comprising the children of tuberculous parents would possibly have been brought up in such a way as to largely diminish their chances of falling victims to the disease. Unfortunately, however, the ideas then held as to the most effective methods of preventing and checking the malady were so fallacious that they resulted in persons suspected of hereditary taint being exposed to precisely the conditions most favourable to the inception and progress of the disease. The unhappy individual who was regarded as having within him from birth the seeds of the dread malady was habitually kept in close and stuffy rooms, shielded from the supposed malignant influence of the outer air, dressed in heavy and unhealthy clothes, and debarred from most kinds of active and salutary exercise. Under such conditions. it is not to be wondered at that the disease became chronic in many of the families in which these mistaken precautions were adopted, with the consequence, of course, that these all too numerous instances were regarded as further proofs of the hereditary character of the complaint.

Fortunately, Koch's discovery of the tubercle bacillus has not only made evident the true methods of combating the spread of the disease, but has also dissipated the grim delusion that a large proportion of the population is doomed from birth to fall victims to the disease. It is now practically universally held by medical men that, with the exception of certain comparatively rare cases, which will be referred to later on, the bacillus is not introduced into a child's system by its parents before birth, that is to say, that consumption is not, as a rule, directly transmitted by means of heredity. This position is so little contested nowadays that it is not necessary to quote more than the following few and brief expressions of opinion, from papers read at the Congress, in its support. Professor Koch himself, in the contribution which he read before a general meeting on the second day of the Congress, said that " It had now been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare," and he expressed the opinion that "We are at liberty, in considering our practical measures, to leave this form of origination entirely out of account."

Dr. S. A. Knopf, of New York, contributed a paper in which the popular idea as to the frequency of hereditary transmission was refuted at considerable length, the conclusion he arrived at being that post-natal infection, through living in the house of an unclean, ignorant, or careless consumptive, is the main source of tuberculosis in infancy and childhood.

Dr. J. E. Squire, Physician to the North London Consumption Hospital, brought before the Congress a large number of statistics which tended to show that, in by far the greater number of cases of consumptive patients who had a tuberculous family history, the inception of the disease was due to occupation and surroundings, and not to direct hereditary transmission.

Dr. E. Mosny, of Paris, in the course of an interesting paper, strongly took the view that consumptives do not transmit the bacillus to their offspring at the time of conception, and that when the germs of the disease are conveyed to the child before birth it is due to intra-uterine infection from the mother, a circumstance which he considers to be of infrequent occurrence.

But although, as has been seen, it is the unanimous opinion of the leading authorities on the subject that direct hereditary transmission is only a very minor factor in the spread of tuberculosis, it would be altogether a mistake to suppose that heredity does not, in an indirect way, exercise considerable influence over the inception and development of the disease. Before, however, dealing with this side of the matter, I ought to mention that several papers were read which related to the question of the occurrence of direct hereditary transmission of tuberculosis under certain conditions, mainly arising from the state of health of the mother during her pregnancy. But as the subject is a very technical one, and is admittedly not of the first importance, I will only remark, for the benefit of those readers who wish to go further into the matter, that references to it were made in the papers, among others, contributed by Dr. E. Mosny, Dr. A. Kuttner, of Berlin, Dr. G. E. Papillon, of Paris, and Dr. J. E. Squire.

Turning now to the more indirect influence of heredity on the propagation of the disease, it must be admitted that there is considerable difference of opinion as to the extent to which this is exerted. I will take first (though, of course, it only bears very indirectly on the question of heredity) a point on which there is is no difference of opinion—the danger incurred by children living with consumptive parents or relations who do not take precautions to prevent themselves becoming centres of infection. Unless very great care is taken to prevent the bacillus being transmitted, whether by kissing, by spitting, or through infected clothing, from the consumptive to other members of the family, there is naturally very great risk that some of the latter will develop the disease. It is, indeed, to infection thus transmitted that the circumstance that consumption often "runs in families" must be very largely, if not wholly, attributed. The precautions which should be adopted to prevent the transmission of the bacilli in this way can more conveniently be dealt with when I come to consider another branch of the Conference's proceedings, so they need not at present detain me.

Adverting now to less indirect aspects of the question of heredity, it may be said that the three principal points discussed by the Congress were the following:—

(1) Can a specific predisposition to tuberculosis be inherited?

(2) Are children of tuberculous parents likely to possess enfeebled constitutions, rendering them especially easy victims to the attacks of disease-producing bacilli, that of tuberculosis among the number?

(3) Does tuberculosis in the parents, instead of predisposing the children to the disease, confer upon them a certain degree of immunity from it?

To the lay reader the difference between the first two questions may appear one rather of form than substance, but it is nevertheless not without importance to ascertain whether the children of tuberculous parents are specially predisposed to the ravages of the tubercle bacillus in particular, or whether they are simply liable to inherit constitutions so physically inferior as to be an easy prey to infectious disease, whether tuberculous or otherwise. The point is one on which there is some difference of opinion, but it will be sufficient here to give the following brief summaries of two papers read at the Congress:—

Dr. E. Mosny, in a paper which has already been referred to, expresses the opinion that consumptives do not transmit to their offspring either a specific predisposition to tubercular infection, or any noteworthy immunity from it. On the other hand, he thinks it incorrect to suppose that tuberculosis in the parents does not exercise any influence on the health of their children. He is of opinion that the presence of tuberculosis in the mother may react in a variety of ways on the child, both before and after birth, frequently tending to produce abortions, premature birth, etc., and to render the children who survive birth sickly, badly developed, malformed, and liable to various affections of the heart, as well as very susceptible to all kinds of infection. Such evil consequences may manifest themselves either in infancy or at later periods of life, especially at critical epochs, such as puberty. I may thus translate Dr. Mosny's summing up of the matter: "Tuberculosis in the parents no more predisposes the organism of the offspring to tubercular infection than it gives it immunity against its attacks; but the offspring of consumptives, being organically and functionally imperfect, weak from birth, and more affected than others by the incidents of their growth, seem to be predisposed to bacillary infection because, in their case, the risks of contagion are infinitely multiplied by immediate and constant contact with infected persons, and because their debilitated organisms offer less resistance to the infection which is the consequence of this contact."

Dr. Knopf, whose paper also has already been referred to, expresses a similar opinion in the following words: "There is inherited very often from a tuberculous mother, much more rarely from a tuberculous father, a physiological poverty, which may handicap the offspring in its development, and offers, when occasion presents itself, a suitable soil for the invasion of the bacilli of tuberculosis."

In brief, it may be said that the general opinion is that the children of tuberculous parents are, other conditions being equal, more likely to fall a prey to tuberculosis, and other infectious diseases, than the children of non-tuberculous parents. If, however, those who have had the misfortune to have a tuberculous father or mother are carefully guarded from infection, and brought up under good hygienic conditions, it is generally held that they have a very good chance of altogether escaping the disease. On this point I may again quote Dr. Knopf, who expresses himself as convinced that "many of these children born tuberculisable could be protected from contracting the disease by being placed from childhood in proper sanitary surroundings, and given a prophylactic, hygienic and dietetic treatment." He considers that respiratory exercises for the development of the lungs should be a prominent feature of the prophylactic treatment adopted. When the mother is known to be tuberculous, Dr. Knopf thinks that the hygienic and dietetic treatment should be commenced while the child is still *in utero*, the most healthful life, generous diet, comfortable garments, and breathing exercise in the open air being prescribed for the mother during the state of pregnancy.

After what has been written above, the proposition suggested in the third question, namely, that tuberculosis in the parents, instead of predisposing the children to the disease, may actually, in some degree, afford them immunity against it, must naturally appear a rather startling one. Still, the facts and statistics given in some of the papers read at the Congress render it unwise to exclude the possibility that the children of tuberculous parents may to some extent inherit a counteracting force, which tends to give them some measure of protection, although, of course, such protecting influence, if it exists, may often be neutralised by the fact that the children of tuberculous persons are more exposed to the infection than those born of healthy parents.

This view may perhaps be best illustrated by a brief summary of the paper contributed by Dr. H. Maxon King, of New York University. Dr. King states that he has embodied in his paper the results of observations in 242 cases of tuberculosis occurring in his own practice, in all of which he had exceptional opportunities for learning the family history, and other pertinent details. The conclusion to which his observation of these cases has brought him is that "a history of tuberculosis in the parents, instead of predisposing the child to the disease, confers, to a certain extent, an immunity to it—an immunity which is, of course, only relative, and not sufficiently protective, yet such as to deserve a more thorough and unprejudiced attention than has thus far been accorded to the subject."

Dr. King, in the course of his paper, gave elaborate analyses of the cases mentioned above with a view to showing that the percentage among them of consumptives having a tubercular parentage was actually smaller than that of those having a non-tubercular parentage, notwithstanding the fact that the former must naturally have been much more exposed to infection. He also produced statistics to prove that the children of tuberculous parents, when attacked by the disease, show greater resistance, and a stronger tendency to recover, than other persons. Thus, he states, that out of the 242 cases, 103 proved fatal, and that of these no less than 76 were among individuals of non-tubercular parentage, as against 27 deaths among patients with tubercular family histories. Moreover, the average duration of the disease, from its earliest evidences to death, among the 76 offspring of non-tubercular parents was 2.93 years, while among the 27 children with tubercular parentage it was 4.01 years, that is, more than a year longer. Dr. King also supported his theory by citing instances of tuberculous outbreaks among negroes and Indians of the Far Western States of America, of non-tubercular heredity, who, nevertheless, show the least possible resistance to the disease, with the result that a rapidly fatal termination is the almost unexceptional rule, and this in a climate whither white persons, rendered more immune by heredity, are sent, as a therapeutic measure, when suffering from the malady.

Of course, it will be understood that, whatever may be discovered in the future in justification of the theory of Dr. King, and others, that the children of tuberculous parents are provided, as a set off to the disadvantages under which they labour, with some inherent protective influence against the disease, it is none the less true that the almost unanimous present opinion among medical men is that such persons are specially liable, both through weakness of constitution, and their greater exposure to the risks of infection, to contract the disease, and that therefore special precautions should be observed in their case.

Before concluding this imperfect *resumé* of the proceedings of the Congress in reference to heredity, perhaps it may not be inappropriate if I append some statistics as to the influence of paternal and maternal age at the time of birth of the child, which are given in a paper contributed by Dr. Joseph Von Korosy, of Buda-Pesth. These statistics relate to 10,385 children, who died at or under the age of ten. Dr. Von Korosy found that, amongst 100 deceased children, of those of them who died of consumption, 8.45 had mothers who were under twenty at the time of birth, 5.09 had mothers who were from twenty to thirty at the time of birth, 2.78 had mothers who were from thirty to thiry-five at the time of birth, and 4.26 had mothers who were above thirty-five at the time of birth. Thus consumption appeared most frequently amongst children of very young mothers, least frequently with mothers between thirty and thirty-five, and became again more frequent with mothers over the latter age. Dr. Von Korosy likewise found that the percentage of tuberculous children was greatest amongst those born of fathers under twenty-five or over forty years of age.

CHAPTER III.

Infection from Tuberculous Sputum.

IF it must be admitted that, in the course of the Congress, wide differences of opinion were apparent as to many of the subjects discussed, it can yet be said that on at least one subject there was the utmost possible unanimity. That tuberculous sputum is a most potent, if not the most potent, factor in the distribution of the bacilli of tuberculosis was proclaimed on all hands.

Since all are of one opinion in this matter, I shall sufficiently indicate the general feeling of the Congress if, in the first instance, I quote passages from the papers contributed by Professors Koch and Brouardel. I will then briefly deal with some of the suggestions made for lessening the risk of infection from this source. Professor Koch, after referring to the introduction of tubercle bacilli into the lungs by inhalation, went on to say: "As to the question where the inhaled tubercle bacilli have come from, there is no doubt. On the contrary, we know with certainty that they get into the air with the sputum of consumptive patients. This sputum, especially in advanced cases of the disease, almost always contains tubercle bacilli, sometimes in incredible quantities. By coughing, and even speaking, it is flung into the air in little drops, that is, in a moist condition, and can at once infect persons who happen to be near the cougher. But then it may also be pulverised when dried, in the linen or on the floor, for instance, and get into the air in the form of dust. In this manner a complete circle, a so-called *circulus vitiosus*, has been formed for the process of infection, from the diseased lung, which produces phlegm and pus containing tubercle bacilli, to the formation of moist and dry particles (which in virtue of their smallness can keep floating a good while in the air), and, finally, to new infection, if particles penetrate, with the air, into a healthy lung, and originate the disease anew. But the tubercle bacilli may get to other organs of the body in the same way, and thus originate other forms of tuberculosis, but this is a considerably rarer case. The sputum of consumptive people, then, is to be regarded as the main source of the infection of tuberculosis. On this point, I suppose, all are agreed."

Professor Brouardel spoke even more emphatically. "The danger," he said, "is in the sputum, which contains thousands of consumption germs. To expectorate on the ground is a disgusting and dangerous habit. Once this habit has quite disappeared, tuberculosis will decrease rapidly." "What *rôle*," he asked in another passage, "does this sputum play in the propagation of the disease? It varies in different cases. Collected and shut up in a private or common, but antiseptic spittoon, destroyed by incineration, or in some other manner, it is dangerous to no one. Thrown into dry and well-lighted surroundings, exposed to the rays of the sun, it will soon lose its dangerous properties. But if it remains in damp and dark surroundings, it will retain its activity for a long time."

The danger from tuberculous sputum being, then, so great, it has to be seen what precautions it is possible to take against it. The sources of danger may be said to be twofold, arising—

(1) From the widespread habit of indiscriminate and quite unnecessary spitting in public places, which is particularly prevalent among the working classes, although large numbers of persons of higher standing unfortunately also frequently indulge in it.

(2) From the unavoidable expectoration by persons suffering from certain stages of consumption.

In the first case, the obvious remedy is, if possible, to put an end to a habit which is as senseless as it is dangerous; in the second case, all that can be done is to treat the sputum in such a way as to reduce to a minimum the risk of infection being conveyed by it.

Taking, to begin with, the question of spitting in public places—the street, the railway station, in carriages, omnibuses, trams, etc.—there are two possible ways in which an endeavour may be made to abolish the practice, one being by making spitting in places of public resort a punishable offence, and the other by bringing home to the public mind the real nature and consequence of an act which is frequently committed lightly and unthinkingly, with no conception of the results which may accrue.

In some countries the law has already been put into action against the practice of spitting. This is the case, for instance, in the United States, where, according to Professor Brouardel, no less a person than a millionaire was recently fined for committing this offence, and, on repeating it, was imprisoned for twenty-four hours. In Sydney, too, we are told by the same authority, spitting in the street is punishable by a fine of £1.

In Europe no such stringent measures have yet been adopted, and possibly public opinion has not yet been educated up to a point which would reconcile it to their adoption. As Professor Brouardel very wisely remarked, "It is only possible to bring into force a law which interferes with our daily life, which disturbs inveterate habits, when it is called for by public opinion, when all are convinced of its benefits, and everyone recognises the danger of his vicious habits, and is ready personallv to reform them, and to require his neighbour to do the same." Short of legislative action, however, there is no doubt that a great deal can be done to lessen the prevalence of promiscuous spitting, even if it cannot be done away with altogether. In America, it was the result achieved by an active newspaper campaign in enlightening public opinion which made it possible to put the laws referred to into force. Here, too, there can be no doubt that the Press, more, perhaps, than any other agency, has it in its power to make people realise the dangers of spitting, and set themselves, as far as they are able, to put it down, and, happily, there have been signs since the meeting of the Congress that not a few of our newspapers are inclined to take action in this direction. Nor should the power of public opinion in such a matter as this be under-estimated. When once persons who have become addicted to spitting find that indulgence in the practice exposes them to the opprobrium of their neighbours, it is certain that very many of them, at least, will be brought to see the error of their ways. In addition to the influence of the Press, a great deal of good can be affected in this matter by means of literature distributed by local sanitary authorities, or voluntary associations formed for combating the ravages of consumption. In this direction a good start has been made in this country by the various branches of the National Association for the Prevention of Consumption, of which the King is President, and under the auspices of which the Congress was held.

In France, even more energetic efforts are being made for the education of public opinion. According to a paper read by Dr. Alfred Hillier, of the London Open-Air Sanatorium, more has been done in this respect by our neighbours across the Channel than by any other nation. There are two national societies of much power and influence, "*L'œuvre de la Tuberculose,*" and "*La Ligue Française contre la Tuberculose.*" Of these, the latter is the more popular in character, but both have done excellent work in disseminating information, and in bringing pressure to bear on various State and Municipal departments. At Bordeaux, the local authorities have gone so far as to create a municipal department for the specific purpose of combating tuberculosis, part of the work of which lies in the distribution of information, the danger of spitting being dealt with, among other matters. At Lille, again, much educational work is being done through the medium of the Emile Roux Anti-Tubercular Dispensary, of which I shall have to say more hereafter.

In Germany, the Insurance and Friendly Societies have actively taken up the work of enlightening public opinion, and there were distributed at the Congress copies of an admirable German circular, of which no less than 1,300,000 copies have been circulated. In this document, which contains a great amount of information concerning the causes and prevention of consumption in a popular form, the evil effects of the practice of spitting in public are clearly pointed out, and directions are given for the safe removal of the sputum of consumptive persons.

Another way in which much good may be done is by placing prominent notices against spitting in all public places, such, for instance, as theatres, music-halls, public-houses, railway-stations and trains, libraries, omnibuses, tramcars, markets, etc. Some railway and omnibus and tram companies, and other authorities having control over places of public resort, already take action in this direction, but there are many others who have not yet seen fit to take any steps in the matter. Much more, too, might be done in the way of ensuring the cleanliness of the floors of public buildings, and of omnibuses, railway carriages, tramcars, etc. Too often dust and dirt of all kinds are allowed to remain undisturbed upon them for days, and even longer periods, at a time, with the result that frequently large quantities of dried sputum are accumulated, to the great danger of persons having occasion to use them. Yet another direction in which good could be accomplished lies in the provision of properly-constructed spittoons in public-houses, barbers' shops, and other places in which numbers of men are wont to congregate. The large, open spittoons, filled with sawdust, and but rarely cleansed, are often as much a source of danger as a means of protection.

Before quitting this branch of the subject, it may be as well for me to quote from Dr. Hillier's paper the text of some regulations now in force in New York.

Section 194 of the Sanitary Code of the Board of Health of the City of New York for 1900 runs as follows: "Spitting upon the floors of public buildings, and of railroad cars, and of ferry-boats, and upon any station, platforms, or stairs of elevated railroads, is hereby forbidden, and officers in charge or control of all such buildings, platforms, cars, stairs, and boats shall keep posted permanently in each public building, and in each railroad car, and on each station platform of elevated railroads, and in each ferry-boat, a sufficient number of notices forbidding spitting upon the floors; and janitors of buildings, conductors of cars, and *employés* upon ferry-boats and station platforms shall call the attention of all violators of this ordinance to such notices. And it shall be the duty of all persons and corporations manufacturing cigars or conducting the business of printing, where ten or more persons are employed on the premises, in the City of New York, to provide, and they are hereby required to provide, proper receptacles for spitting, in the proportion of one to every two persons employed by them, and it shall be seen that the said receptacles be disinfected and cleansed at least once every working day." Anyone neglecting the provision of spittoons is liable to "arrest, with penalty, fine, and imprisonment."

It is difficult to see what objection there would be to imposing somewhat similar obligations as to notices and spittoons upon railway companies, proprietors of public conveyances, and employers of labour, in this country. Restrictions which are willingly accepted by the independent democracy of the United States ought not to prove too onerous for our own disciplined and law-abiding population.

It is occasionally said that, inasmuch as it is only the sputum from tuberculous persons which can convey the infection, it is unnecessary to compel healthy persons to forego the practice; but a moment's thought will show that there is no force in this objection. As Dr. Hillier pointed out to the Congress, it is impossible to discriminate in this matter between consumptives and non-consumptives. To make such a distinction would be impracticable, for it constantly occurs that the existence of phthisis is not discovered until an advanced stage of the malady has been reached. Indeed, it is beyond doubt that large numbers of persons who consider themselves healthy, and are generally so regarded, are, in reality, sufferers from tuberculosis. The only real safeguard, therefore, is to put an end to public spitting altogether. Turning now to the question of the disposal of the sputum of consumptive patients, to whom spitting is a necessity, we find that on two points there were no differences of opinion among members of the Congress—namely, that the only really effective way to destroy the sputum is to burn it, and that consumptives should not be allowed, as is too often the case, to spit into their handkerchiefs. The opinion generally expressed was that patients should carry with them, for use out of doors, a small, bottle-shaped spittoon, the kind known as the Dettweiler being the most popular, the sputum, when emptied from the bottle, being at once burned; and that, when at home, they should either use the above-mentioned spittoon, or spit into a piece of paper, which should then be thrown into the fire, or burnt with a match. Professor Schrötter, of Vienna, in the course of a paper on the "Destruction of Tuberculous Sputa," suggested that the sputum of patients lying in bed should be collected in a *papier maché* spittoon, such as one which he has himself designed, in which a little powdered turf has been placed, and that then the spittoon itself, well mixed with turf, should be cast into the fire.

A paper read by Dr. Espina y Capo, of the Royal Medical Academy of Spain, recommended that, instead of bottle spittoons, sanitary paper should be employed, out of doors as well as indoors. With reference to spittoons, he says: "Although embodying the great principle of abolishing the bad habit of spitting on the handkerchief, all have the common defect of accumulating the sputum. The disposal of this latter by means of running water is not always possible, and the fresh risk of carrying the sputum into the street warrants the conclusion that not one of them fulfils the claims of hygiene and prophylaxis. Bearing in mind that in the solution of this problem no provision that is not at once cheap, practical, and easily obtainable by all can be a true solution, it may be suggested that by employing the simple, economical, and clean toilet paper used for the "w.c." in all civilised countries, we shall reach the hygienic desideratum."

Dr. y Capo goes on to say that "It will be sufficient if all people use hygienic paper, instead of the traditional handkerchief which we carry permanently in our pockets, dirty with mucus, sweat, and saliva. The sputum which it contains transforms the pocket into a veritable microbe centre, in which the bacilli dry, and retain their vitality for a long time. The destruction of this hygienic paper is so easy, that a match only is necessary to incinerate it, together with the sputum it contains . . . . Another consideration which must be urged on behalf of hygienic paper is the difficulty of exchanging the handkerchief when it is dirty, and the necessity of carrying it in that condition a sufficient time to infect the pockets. . . . . The chief advantages of the paper are its cheapness, ease of destruction, and the aseptic cleanliness of the pocket and nails, which, in the case of the handkerchief, are infected at the moment of taking it between the hands. But if in common use, it is essentially clean and hygienic, its employment in cases of tuberculosis is of inestimable hygienic value, because in analysing the various products found on dirty handkerchiefs, we find all kinds of microbes, including the bacillus of Koch, which, as is well known, preserves its pathogenic conditions, notwithstanding the washing and drying processes, since it requires special means, to which a handkerchief is never subjected, to destroy it."

I may add that the German circular to which I have already referred recommends that every person, well or sick, who is in the habit of spitting, should spit into spittoons, placed at convenient corners in the living rooms, filled with water, which should be cleansed at frequent intervals by being washed out. It also urges that the hand should always be held before the mouth when spitting or coughing, and that one should always turn away from anyone who is so engaged.

In connection with the question of the unhygienic character of the ordinary handkerchief, it may be mentioned that a useful substitute for this article has recently been introduced in the form of a small square of antiseptic gauze, known as "Sanichief." The gauze is pleasant to use, and its antiseptic qualities go some way to remove the dangers of contagion, while its small cost admits of its destruction before undue saturation with sputum has taken place.

CHAPTER IV.

Alcoholism and Consumption.

THERE may be said to have been three stages of opinion among medical men with regard to the relation of alcohol to consumption. In the first stage it was generally held that alcoholism was antagonistic to consumption, and that the use of alcohol in large quantities was a valuable agent in the treatment of the disease. In the second stage of opinion, the theory that the excessive use of alcohol afforded protection against the malady was largely abandoned, and it was held that, on the contrary, chronic alcoholism, by enfeebling the system, reducing the amount of nutrition taken, and often leading to insanitary habits, facilitated the inception and development of consumption. In the third stage, which is represented by many of the leading authorities of the present day, there has arisen a strong suspicion, amounting, in some cases, to conviction, that alcohol directly favours the formation of tubercle by rendering the tissues specially prone to the infection.

I can perhaps best illustrate the phases through which medical opinion has passed on this very important subject by summarising a very interesting paper on "The Relation of Alcoholism to Consumption," contributed by Dr. T. N. Kelynack, of the Royal Infirmary and Owen's College, Manchester, which I will supplement by some extracts from the paper read by Professor Brouardel. Dr. Kelynack points out that, in the days before the discovery of the tubercle bacillus, the view that excessive drinking afforded some measure of protection against tuberculosis was widely held. It was considered by Huss, and other medical men of distinction, that the disease rarely existed in the case of drunkards, and this view was thought to be confirmed by the results of *post-mortem* examinations. Writing in 1858, Dr. Richard Payne Cotton observed: "It is worthy of remark that the habitual drunkard—he who is always in his cups—is not very often the subject of phthisis, such, at least, is the result of my own observations." Such being the opinion of not a few men of eminence in those days, it is not surprising that many medical practitioners recommended the use of large quantities of alcohol in the treatment of the disease. Dr. Charteris stated in 1877 that, in his private practice, he ordered whisky to be taken *ad libitum.* Dr. Harris tried the effect of whisky, containing 53 per cent. of alcohol, during nine months, on twenty-six patients, commencing the doses with two drachms of pure whisky, and gradually increasing them up to one-and-a-half ounces every four hours, day and night. Dr. Harris expressed the opinion that no case left the hospital in a worse state than it entered it, but he seems to have been unable to claim that any notable improvement had been effected. As late as 1885, so distinguished an authority as Dr. Hermann Weber stated that he was convinced of the great usefulness of alcohol in the treatment of phthisis. The theory of the beneficial influence of alcohol was, however, not without its opponents, even in the days of its greatest popularity. As far back as 1859, Bell, of New York, declared that the idea that alcoholic liquors had a marked influence in preventing the deposition of tubercle was destitute of any solid foundation. He contended, on the contrary, that "their use appears rather to predispose to tubercular deposition," that "when tubercle exists, alcohol has no obvious effect in modifying the usual course it takes," and that it does not "mitigate, in any considerable degree, the morbid effects of tubercle upon the system in any stage of the disease."

These views, in spite of some opposition, have been gradually growing in favour, especially during the last few years, but it must be said that the adherents of the older opinion have not yet been altogether silenced. Nowadays, however, it may fairly be said that the almost universal opinion among the medical profession is that the excessive use of alcohol is favourable to the development of tuberculosis. Whether this injurious influence of intemperance is merely indirect, or whether the alcohol has a direct deleterious effect on the tissues, preparing them for the formation of the tubercle, is a question on which there is a great difference of opinion. The former view is the one that has generally prevailed up to the present time. As Dr. Kelynack remarks, it has been, and is, held by many that alcoholism bears no special relationship to tuberculosis, and only exerts an indirect influence in so far as it leads to a lowering of general vitality, and places the individual under conditions particularly favourable to the infection of tubercle. It is generally admitted, however, that this influence of alcoholism on consumption, even though indirect, is a very powerful one. In the words of Dr. Kelynack, the habits of the excessive drinker "lead in great measure to an in-door existence, the maintenance of an insanitary environment, insufficiency of suitable food, oftentimes to the influence of depressing emotions, and not infrequently his indulgence necessitates his following an occupation under conditions which are peculiarly inimicable to health."

The evil effects of immoderate drinking, in regard to consumption, are considered to be especially marked where a sedentary town life is led, and an abundance of good food is not taken. It will be seen that, the indirect influences of alcoholism being generally supposed to be so extensive, it is difficult to distinguish between them and the direct effect on the tissues, which alcohol, largely taken, may exercise. Of late years, however, says Dr. Kelynack, the view that alcoholism definitely predisposes to tuberculosis by rendering the tissues specially prone to tuberculous infection has been largely taken. In support of this view, he quotes the following statement by Dr. Hector Mackenzie: "Alcoholism must be regarded as a powerful predisposing cause of tuberculosis. . . . It is almost invariable to find tubercle present in the lungs in patients dying in the course of alcoholic paralysis. Tubercle of the peritoneum, or pleura, frequently complicates cirrhosis of the liver." He likewise quotes from an article by Drs. Poore and Allchin the statement that the association of tuberculous phthisis with alcoholic cirrhosis of the liver is well established, the course of the disease being usually one of rapid caseation and excavation, with broncho-pneumonia." Again, it is stated that pulmonary tuberculosis was found by Dickenson to be more frequent in drinkers than in ordinary people, in the proportion of three to one, and that, according to H. Mackenzie, out of sixty-seven cases of pulmonary tuberculosis occurring in drinkers, a family history of tuberculosis was found in only ten, whereas it is found in about 30 per cent. of the ordinary cases. In all the above instances it might perhaps be fairly objected that there is nothing to definitely show that the evil influence of alcoholism was exercised otherwise than indirectly. With regard to this point, I may quote from Dr. Kelynack's account of experiments recently made by Professor Sims Woodhead, Dr. Deléarde, and Professor Abbott.

Professor Sims Woodhead, he states, has recently shown that alcohol has a marked influence in altering, or determining alterations, of the cells of animals subjected to the action of certain disease-producing organisms, while Professor Abbott and Dr. Del arde, working independently, have discovered that alcoholised animals are more readily infected by many organisms than non-alcoholised animals, and also that animals brought into a state of chronic alcoholism are much less easily rendered immune to microbial infection. Dr. Kelynack concluded his paper by recording the results of his observations of hospital cases at Manchester during a number of years. Of these, I may briefly refer to his remarks concerning certain fatal cases of peripheral neuritis, and the recent outbreak of beer poisoning at Manchester. He gives particulars concerning ten cases of peripheral neuritis occurring in chronic alcoholics, nine females and one male, in which he made pathological examinations. Out of the ten, eight, or 80 per cent., were found to be suffering from pulmonary tuberculosis. In six cases both lungs were found to be involved, while of the two women who did not exhibit tubercle, one had congested, œdematous lungs, which showed traces of broncho-pneumonia.

With regard to the outbreak of arsenical neuritis, arising from the consumption of beer, which occurred mainly among chronic alcoholics, Dr. Kelynack states that, in a considerable number of the fatal cases, active pulmonary tuberculosis was present, and in some undoubtedly hastened the end.

I may now turn to the paper read by Professor Brouardel, who expressed a very strong opinon as to the part played by alcoholism in the propagation of tuberculosis. After referring to the effect of unhealthy and comfortless dwellings in driving working men to the public-house, he went on to say: "It was with reason that Jules Simon remarked: 'The wretched house is the purveyor of the tavern,' and we can add that the tavern is the purveyor of tuberculosis. Alcoholism is, in point of fact, the most powerful factor in the propagation of tuberculosis. The most vigorous man, once become an alcoholic, has no resistance against it. . . . I will quote only two sets of statistics; they are eloquent. That of Tatham shows that, the mean mortality being represented by a hundred, that occasioned by tuberculosis is, in

Barmen	257
Pedlars	239
Dock Labourers	176
Strolling Musicians	174
Hairdressers	149
Brewers	148
Sweeps	141
Publicans	140
Coachmen	124
Coalmen	116
Butchers	105

Baudran, of Beauvais, has shown that mortality from tuberculosis and from alcohol are nearly identical. In this connection he obtained the following results:—

Deaths from Tuberculosis in 10,000 Inhabitants	Annual Consumption of Litres of Alcohol per Head.
30 to 40	12.47
40 to 50	15.21
50 to 60	14.72
70 to 80	16.36
80 to 90	17.16
More than 90	50.70"

"Any measures, states, or individuals," Professor Brouardel continued, "tending to limit the ravages of alcoholism will be our most precious auxiliaries in the crusade against tuberculosis." I should add that I am here only dealing with the influence of immoderate drinking; I shall refer to the question of the use of alcohol in moderation, and as an occasional stimulant, when I come to consider the dieting and general mode of treatment of consumptive patients.

CHAPTER V.

The Prevalence and Distribution of Consumption.

STATISTICS seldom afford very attractive reading, but as they, neverthciess, play an essential part in building up our knowledge of the extent, virulence, and comparative import to the community of the varous forms of disease, I will endeavour to place before the reader, as briefly as possible, and without any superfluity of figures, some of the principal estimates of the prevalence and distribution of tubercular phthisis, and other varieties of tuberculosis, which were placed before the Congress. If they serve no other purpose, they will at least bring home to the mind the enormous proportions of the malady against which the forces of civilisation are now being arrayed. They may also provide no small measure of encouragement, since they unqucstionably show that very real progress has already been made in checking the ravages of the disease. The greater part of the statistics with which I propose to deal have reference to the United Kingdom, but I may commence with a few figures relating to the prevalence of the malady in other parts of the world.

Dr. Van Ryn, of the Belgian National League against Tuberculosis, estimated, in a paper contributed to the State Section, that throughout the world three million persons die yearly from the different forms of this disease, and that the total number of individuals suffcring from it reaches the enormous figure of fifteen millions. Yet, terrible as this estimate is, it is a good deal lower than that formed by many other competent authorities. Thus, Dr. Bezly Thorne, in a contribution to the same Section, computed that one-seventh of the human race fall victims to tuberculosis. Professor Brouardel, in a paper to which I have already made allusions, credited the different varieties of the disease with a proportion of the total mortality of not less than one-sixth, and rising, in the case of some countries, to a fourth. Professor Clifford Allbutt did not hesitate to put the proportion of persons more or less affected with tuberculosis at a third of the population.

Turning now to individual countries, we find Dr. Bonnet Léon's estimate, in a paper "On the Function of Anti-Tubercular Dispensaries," is that in France over 150,000 persons die annually of tuberculosis, and this figure, he tells us, is constantly increasing. In the town of Lille alone, with a population of 220,000, the sufferers from the disease, among the poorer classes only, average 6,000 a year, of whom, according to Dr. A. Calmette, from whose paper these figures are taken, 1,000 to 1,200 die yearly. In Germany, from statistics given by Professor Koch, it appears that there are 226,000 persons over fifteen years of age who are so far gone in consumption that hospital treatment is necessary. I have not at hand figures relating to the other European countries, but it may be taken that, in the majority of them, the prevalence of the disease is at least not less than in France and Germany.

With regard to the progress achieved, elsewhere than in England, in diminishing the mortality from tuberculosis, Professor Koch furnished some instructive and encouraging figures. Thus, before 1889, the average mortality from this disease, in Prussia, was 31.4 per 10,000, whereas for the period 1889-97 it sank to 21.8, which is to say that the number of deaths was 184,000 less than it would have been had the previous average been maintained.

This is an advance of which Germany may well be proud, yet in other countries not less striking results have been achieved. In New York, under the influence of sanitary measures, directed by Dr. Biggs, to whom Professor Koch paid a high compliment, the tuberculosis mortality has decreased by more than 35 per cent. since 1886. So encouraging, indeed, has been the experience of New York, that Dr. Biggs hopes that in five years' time the annual number of deaths there will be 3,000 less than formerly. Perhaps I may take this opportunity of pointing out that Professor Koch urgently recommended Dr. Biggs' method of organisation to the study and imitation of all municipal sanitary authorities.

Turning now to our own country, we find that here also tuberculosis has a terrible share in the annual mortality. According to a paper by Dr. St. Clair Thompson, of the Throat Hospital, Golden Square, who is supported by other authorities, pulmonary tuberculosis alone is responsible for 70,000 deaths annually. Dr. Bezly Thorne puts the mortality from this cause at the lower, but still very high, figure of 60,000. In London alone, tuberculosis is responsible for 8,000 deaths every year, and it is estimated that from 1891 to 1895 as many people in England and Wales fell victims to this one disease as died from all the zymotic maladies put together.

Yet, serious as this mortality is, it certainly, indicates that, in spite of our much-abused climate, and the terrible congestion of our great towns, we compare very favourably with most other nations in this matter. In respect also of progress in diminishing the disease, it is very pleasant to find that, on the whole, England need not yield the pride of place to any other country. Professor Brouardel, who made some agreeably flattering remarks on our energy in promoting sanitary reform, credited us with having reduced our tuberculosis mortality by 40 per cent., and this does not seem to have been an over-estimate.

The progress which we have made in this direction is very clearly shown in a paper contributed by Dr. John Tatham, of Somerset House; but, before dealing with this, I will briefly summarise some remarks made by Dr. T. E. Hayward, Medical Officer of Health for Haydock, Lancashire, on the influence of phthisis and other tuberculous diseases on English life-tables. The questions he set himself to answer in his paper were: Supposing that these diseases could be made extinct, how many more would be alive at certain ages, and how much longer would they live? He proceeds to answer them by taking the life-table for England and Wales for a recent year, and ascertaining how far it would have been affected if there had been no deaths from tuberculosis. I cannot follow Dr. Hayward through his interesting account of the calculations by which his results have been arrived at, nor is it necessary for me to reproduce the elaborate statistical tables which were appended to his paper. I will, therefore, be content to simply record the conclusions to which he has come. These are that, if there had been no phthisis, the average length of life for each individual born would have been increased by two and a half years; that individuals who have survived the age of fifteen would, if tubercular diseases were extinct, have their average expectation of life increased by no less than three and a quarter years; and, most important of all, that two years would be added to the working period of life, that is, between the ages of fifteen and sixty-five. It also appears that the extinction of tubercular diseases, other than phthisis, would only have increased the average expectation of life by one-fifth of a year.

Dr. Tatham's paper commences by pointing out that the mortality from phthisis, at all ages, in

1896-99 was equal to a rate of 1,521 *per* million living, among males, and 1,141 among females. Among male children under five years the rate was 403 per million, and among female children 334. At the ages 10-15 the male rate was 195, and the female rate 410. In both sexes the real liability to phthisis begins between the fifteenth and twentieth years. Among males the death rate at 15-20 is 908 per million, and it attains its maximum at 45-55, when it reaches 3,173 per million. Among females, the rate at 15-20 is 1,165, and the maximum is 2,096 per million at 35-45. After the maxima the rate declines rapidly in both sexes. Practically, the incidence of phthisis is upon the ages 15-75, very young children and very old people being largely exempt. Females appear to be less liable to death from phthisis under the age of five years than males, more liable at 5-20 years, and again less liable subsequently.

Dr. Tatham then gives tables showing the mortality ascribed to phthisis during the years 1851-1899, from which the gratifying fact appears that every age group in both sexes has shown a decrease in deaths from this disease. Comparing 1896-1899 with 1851-60, we find that phthisis mortality in males, at all ages, has been reduced from 2,579 to 1,521 per million, and in females from 2,775 to 1,141. At ages under five, the mortality of males has been reduced from 1,329 to 403; that of females from 1,281 to 334. Nearly all other ages show equally good results. It will be felt, I am sure, that these very encouraging figures should serve as a stimulus to take up the campaign against consumption with redoubled vigour.

CHAPTER VI.

The Importance of the Early Treatment of Consumption.

"PHTHISIS, if treated early enough, can be cured." This is the opinion expressed by Hippocrates, the Father of Medicine, some twenty-five centuries ago, and it remains to-day the unanimous verdict of the medical profession. Speaker after speaker at the Congress laid emphasis on the curability of the disease, but all added the essential condition, "if it be taken in time." Indeed, it has been contended that consumption is really one of the most curable of diseases, and this assertion, which may appear a little startling at first sight, receives no little corroboration from some striking remarks by Professor Brouardel in the paper which he read before a general meeting of the Congress.

"In 1838," he said, "Carswell, one of England's distinguished physicians, wrote: 'Pathological anatomy has never, perhaps, given a more decided proof of the cure of a disease than it has given in cases of pulmonary phthisis.' Laennec, Guillot, and Letulle proved that in more than half the postmortems made, old healed tuberculous lesions were to be found. 'These figures,' says Dr. Ribard, 'show very clearly that half the men believed to be well, and non-tuberculous, dying of old age or some chance cause, have at a certain time in their life been attacked by tuberculosis, but have recovered. Many are, therefore, affected, and many recover, since half the human race has tubercles, and goes on living without discovering them.' "

Professor Brouardel went on to say that, from his personal experience at the Paris Morgue, where he frequently makes post-mortems on persons accidentally killed, he can state that, in half the cases where the individual had lived in Paris for ten years, he found healed tuberculous lesions. "I may add," he continued, "that those persons on whom autopsies are held in almshouses, hospitals, and the Morgue, have certainly taken none of the precautions we consider necessary. In spite of often deplorably dirty habits, the system has been strong enough to resist the ravages of the disease."

It is thus clear that in large numbers of cases tuberculosis of the lungs is capable of spontaneous cure, without any medical treatment whatever. But apart from such examples of constitutions sufficienty strong to, of themselves, repulse the disease, it has been abundantly proved that remedial measures can only be adopted with anything approaching certainty of success when the malady is still in its early stages. There have, doubtless, been not infrequent instances of the disease being arrested, or in some cases actually cured, when a considerably advanced stage had been reached, but, speaking broadly, all medical experience goes to show that early recourse to curative treatment is the essential condition of recovery. On this point I may say, on the authority of Dr. Noel Bardswell, physician to the Banchory Sanatorium, that, whereas it is widely held that sanatoria should cure 80 per cent. of early cases, the statistics relating to the treatment of advanced cases at the Gorbersdorf Sanatorium show that, in the year 1899, 57 per cent. of the 1898 admissions, 80 per cent. of the 1897 admissions, and 94 per cent. of the 1896 admissions were dead.

I take these figures from a very interesting paper contributed to the Congress by Dr. Bardswell, under the title of "The Responsibility of the Medical Profession with regard to Pulmonary Tuberculosis." Dr. Bardswell sets himself to make an analysis of a number of the cases admitted to the sanatorium to which he is attached, with a view to showing that a large proportion of the patients admitted ought clearly to have been subjected to sanatorium treatment at an earlier period, and he discusses the extent to which the medical profession must be held responsible for failure to diagnose the disease, or recommend proper treatment, at a sufficiently early stage. I need not here reproduce Dr. Bardswell's tabular statements as to the condition of the patients when admitted to his sanatorium. I may convey the gist of them by stating that of fifty-seven cases, only 18 per cent. had not exhibited definite tuberculous symptoms three months or more before the date of admission, 30 per cent. had shown such symptoms from three to six months previous, 12 per cent. from six to nine months, 14 per cent. from nine to twelve months, and no less than 27 per cent. had exhibited the symptoms over twelve months before. As to the condition of the lungs on admission, over 50 per cent. had more than two lobes diseased, and a great proportion of these showed definite signs of excavation of the lungs. Similarly, 31 per cent. had already lost more than 14lb. in weight. Altogether, about 40 per cent. of the admissions were cases of too advanced a type for any really satisfactory results, beyond temporary improvement, and arrest of disease, to be anticipated. Dr. Bardswell has attempted to ascertain to what causes the neglect, in such a large proportion of cases, to deal with the disease at an earlier period is due. As the result of inquiry concerning the late admissions to his sanatorium, he has divided them into two groups: Cases in which the patients are chiefly responsible; and cases in which their medical men are mainly responsible. With regard to the former class, he has found that the chief factors have been: Long delay in taking medical advice, in the belief that the ailment was due to a cold or some other temporary cause, refusal to follow good advice till frightened by the appearance of serious symptoms, or delay in following advice on the ground of expense. As to the responsibility of medical men, Dr. Bardswell attributes failure to take early action to the following causes:

(1) Failure to diagnose true nature of disease until far advanced, the cases having been treated as muscular rheumatism, anæmia, debility, chills, influenza, etc.

(2) Concealment of the nature of the disease, when diagnosed, from the patient.

(3) The adoption of merely symptomatic treatment, on the apparent assumption that the disease is inevitably fatal, until friends or relations insist upon sanatorium treatment as a last hope.

(4) An unsuccessful attempt to apply sanatorium treatment at home. As to the way in which these unnecessary delays in taking active measures can be obviated, Dr. Bardswell suggests that, as far as patients and their friends are concerned, the dissemination of a better knowledge of the nature of the disease is the main remedy, and he thinks that, in this direction, much educational work might be done by medical men. With regard to delays for which medical men are themselves responsible, I may quote Dr. Bardswell as follows:- "Firstly, as to failure to diagnose the disease in an early stage, and sometimes, indeed, in a fairly, or well-advanced stage. Granting that physical signs of early phthisis are often very slight or very indefinite, and that early symptoms are so insidious that it is often diffi-

cult to say when a condition of poor, general health ended, and one of tuberculosis began, there remains little or no excuse for a case being allowed to drift into a condition of well-marked disease, with such a certain and easy method at hand for establishing a diagnosis as the examination of the sputum. I have heard it urged that medical practitioners have something else to do than systematically look for bacilli in all their suspicious cases; but, with the facilities now offered for this purpose by public authorities and various associations, such a procedure is quite unnecessary. I feel convinced that systematic examination of chests and sputum of cases who seem to be just run down and out of health, with no very obvious cause, would, in many instances, lead to an early diagnosis of hitherto unsuspected tuberculosis. It is more difficult to account for cases under medical supervision running into an advanced stage of the disease, even a stone or more below weight, before the condition is recognised. Hurried and too superficial chest examination, the outcome of over-work, is no doubt responsible for some of it. . . . Upon the question of wilfully withholding the truth from patients, and substituting such terms as ‘ weak lungs ’ for the true name, there is, doubtless, much diversity of opinion. The word ‘ consumption ’ has, as yet, certainly lost but little of its ill-omen, and it is very striking how studiously sanatorium patients avoid using it. Still, however unpleasant the duty may be of telling a person that he has consumption, I have, personally, no hesitation in saying that, in the great majority of cases, it is a duty. In very many instances, when the truth is concealed, the patient continues work, and takes but little notice of medical advice. In my own experience I have met with many patients with advanced disease, who have remarked: ‘ If only I had been told the truth earlier, how differently I would have acted during the last six months.’

I feel sure that in nearly all cases, honesty, as regards this question, is the best policy—alike for patient and medical man."

Dr. Bezly Thorne contributed a paper in which he emphasised the importance of obtaining an early diagnosis by means of bacteriological examination of the sputum, and urged that this should be provided for by the State. We are confronted, he pointed out, by the two facts, that early recognition of the disease is surrounded by exceptional difficulties, and that, at the same time, it is the dominant factor in curative treatment, whether by the open-air system or by any other method. Moreover, early detection is not only a question of primary importance in relation to curative treatment, but also as regards the no less pressing question of prevention. This is especially the case with regard to sufferers among the working classes, owing to the risk incurred by their families in small and overcrowded dwellings, and by their fellow-workers in factories and workshops. Dr. Bezly Thorne then went on to ask at what period it is that the victim of pulmonary tuberculosis becomes a source of greatest danger to himself and to others. It is, he answered, when his sputa begin to contain and disseminate the tubercle bacillus. We know that the bacillus may maintain its vitality in the dried sputum for considerable periods, and it needs no argument to demonstrate what must be the consequent peril to fellow-workers and to dependents, more especially if the patient has had no specific warning as to the disposal of his sputum. Happily, said Dr. Thorne, it is at this point that science indicates the way to both prevention and cure. If from the moment that the bacillus appears in the sputum the time of greatest danger has arrived, it is also from that moment that the microscope can resolve all doubt as to diagnosis. Early detection may be said to depend on early examination of the sputum. The microscope and the sanatorium should be co-workers. The recognition of the bacillus in the sputum should be the patient's title to the treatment, and its attendant hygienic education. How, then, are we to ensure that the sputa of these people shall be submitted, at the earliest possible moment, to bacteriological examination, the cost of which the patient himself often cannot afford, and which his medical attendant probably has not the means of undertaking? The reply given by Dr. Thorne was that the exigencies of the case are such as cannot be met by the public-spirited action of certain isolated individuals, such as those Medical Officers of Health who now offer facilities for the free examination of sputa. The question is a national one, which can, and must be, dealt with from a national standpoint. The State should, therefore, provide facilities for gratuitous examination. If vaccination is a national concern, urged Dr. Thorne, much more so is the matter now referred to. Without it, he asserted, sanatoria would miss their mark. He concluded his paper by the following summary of the propositions contained within it:—

(1) Early recognition is the essence of the curative treatment of pulmonary tuberculosis; (2) a positive diagnosis in early cases is difficult, apart from detection of the bacillus; (3) the appearance of the bacillus in the sputum marks the turning point of danger to the patient and those with whom he associates; (4) bateriological examination is a national concern and should be provided for by the State.

Before quitting this subject, I may say, that much good work in connection with the early recognition of consumption is being done under the French Dispensary system, as worked at Lille and elsewhere.

CHAPTER VII.

The Notification of Consumption.

AS is well known, consumption is not one of the maladies to which the Infectious Diseases (Notification) Act applies. Since it became established that the disease is spread by means of infection, there has grown up a large body of opinion, to which Professor Koch lent his support in the course of the Congress, in favour of including it within the scope of the Act; but, on the other hand, it is held by many that public feeling is not yet ripe for such a step. Consumption is, in several important respects, on a different footing from the various diseases to which the Act applies, and it cannot as yet be said that there is any unanimity of opinion among the medical profession as to the desirability of compulsory notification.

Such a measure has, I believe, only been resorted to in two instances. It has for some time been in practice in New York, and has more recently been put into force in Norway. The mode of procedure in the latter country was described to the Congress in a paper contributed by Dr. M. Holmboe, of the Norwegian Medical Service. The law, which was passed in May, 1900, and came into effect in January this year, provides for the compulsory notification of all cases which are accompanied by tuberculous discharges. Notification has to be made: (a) of new cases of such disease coming under medical treatment; (b) of deaths of persons suffering from such disease; (c) of change of residence of persons suffering from the disease. The notifications, which are treated as confidential, have to be sent to the local Medical Officer of Health, who then proceeds to take certain precautionary measures, such as seeing that due cleanliness is observed in the homes of the sick, directing the treatment of the secretions, and securing the disinfection of rooms, garments, and bedclothes, before they are used by other persons. As, when the Congress was held, the law had only been in force for some six months, Dr. Holmboe was not in a position to make any definite statement as to its effects. He was, however, able to say that no complaint as to inconveniences resulting from its enforcement had as yet come to the notice of the Directorate of Medical Service.

While, however, most countries have been reluctant to have resort to compulsory measures, a good deal has been done to test the practicability and efficacy of notifying cases of consumption by means of voluntary systems of notification. In several important English towns, such systems are now in active work, and there are indications that their example is likely to be followed pretty extensively in the near future. Perhaps I shall best make clear the objects which it is sought to obtain by voluntary notification, and the methods which have so far been found the most convenient, by taking, as a typical example, the case of Manchester, and setting forth the measures which have there been adopted, and the results which have so far been obtained. The success or failure of an experiment of this kind is a matter of so much interest to all members of Municipal Authorities, that I think I need make no apology for going into the subject with some degree of fulness and detail. My authority for most of the following statements, it should be said, is Alderman McDougall, Deputy Chairman of the Manchester Sanitary Committee, who contributed to the Congress a valuable and interesting paper on the question.

For a number of years the Corporation of Manchester have shown praiseworthy activity in endeavouring to arrest the progress of the disease. As long as seven years ago they commenced a periodical distribution of handbills as to precautionary measures, these having been issued on three occasions to every house in the city. The investigations of Schill and Fischer as to the length of life of the bacillus in dry sputum quickly attracted the attention of the Manchester authorities, and the publication, in 1898, of the results of Dr. Cornet's inquiry into the infectivity of the dust in houses inhabited by consumptive persons convinced them of the desirability of taking some steps against the spread of infection from this source.

In 1899, therefore, the City Council decided to try a scheme of voluntary notification of phthisis which had been submitted by the Sanitary Committee. The objects it was hoped to attain by means of this scheme may be enumerated as follows:—

(1) The instruction of affected households in the precautionary measures to be adopted, by means of visits by medical assistants, who should distribute printed instructions.

(2) The carrying out of the measures of disinfection needed to remove the infective matter already deposited in the houses.

(3) The collection of data for further action.

(4) The maintenance of continuous supervision over infected households in order to secure that any necessary precautionary measures are duly observed from time to time, and to ascertain changes of address.

(5) The promotion of resort to proper hospital treatment.

At first, notifications were only invited from public institutions, but since February, 1900, private practitioners have also been asked to give them. Altogether, from September, 1899, to March, 1901, 2,338 cases have been notified, 1,710 by public institutions, 628 by private practitioners. The *modus operandi* is as follows: On the receipt of a notification, a clerk enters name and address in two books, one arranged according to name, and the other according to addresses, the latter being useful for tracing successive cases in the same house, or adjoining houses. He also enters the name and address on a printed form, which he hands to the Assistant Medical Officer. This form, which contains a number of questions, to which the Visiting Medical Officer has to fill in the answers after visiting the case, is of a somewhat elaborate character. As, however, it is likely to be of interest to local authorities which are inquiring into the question of notification, I think it desirable to reproduce it as follows:—

CASE OF CONSUMPTION INVESTIGATED.

---

1. Sanitary district ....
2. Address ....
3. Name ....
4. Sex ....
5. Age ....
6. Medical attendant ....
7. Health visitor ....
8. Date of notification ....
9. Date of visit..............................
10. Date of death ....
11. How long ill ....
12. How long in present house..............................
13. Owner ....
14. Agent ....

15. Condition of house: Through, back-to-back.. ... Number of rooms...... Clean, dirty...... Ground floor: Damp, dry...... Cellared, not cellared...... Overcrowded, not overcrowded ...... Living-room: Well, badly lighted...... Bedroom: Damp, fireplace, clean..................
   Condition of the yard: Large, small, open, confined...... Flags well set, broken, loose.........
   Drains: Pipe...... Brick...... Lately blocked ...... Properly trapped...... Inoffensive......
   Condition of the privy and ashpit: Class, pail midden, w.c...... Adjoining kitchen or scullery; if not, distance from...... If pail, urine guide good or defective...... Floor, dry, wet, sunk, free from nuisance, emptying required...
16. If disease not contracted in present house, give previous addresses, and how long in them......
17. Condition of previous houses ....
18. Any cases of consumption at these addresses before the present tenants ....
19. Other members of family, with ages..............
20. Have any members of the family been consumptive, either on the father's or mother's side? Give particulars ....
21. Are any other members of the family ill at present; if so, in what manner?....................
22. Give particulars of the physique of the remaining members of the family...........................
23. Was patient known to have been intimate, or to have associated with, any consumptive patient some years before, and at what period?...... Was the person associated with (*a*) a member of the family, (*b*) a relative, (*c*) a companion, (*d*) a workfellow? ....
24. Occupation...... If the patient had left school or workhouse on account of illness, please give date ....
25. Character of work.....................................

26. Character of workshop ....
27. Is patient narrow on the chest and feeble, or strong? ....
28. Has patient sustained any injury, or suffered from any weakening disease, before contracting consumption? ....
29. Has patient had a hard life in any way?...........
30. Personal habits ....
31. If the disease "consumption of the bowels," give milk supply for six months before the commencement of the illness............................
32. Do the family wish the house disinfected?.........
33. Precautions taken at school or place of work......
34. Source of infection ....
35. Investigations made ....
36. Hospital ....
37. Examination of sputum, etc.........................
38. Materials supplied ....
39. Precautions taken:—
    (*a*) Precautions handed to householder...........
    (*b*) Precautions handed to patient.................
    (*c*) Personal instructions given in the precautions required ....
    (*d*) Efficient cleansing carried out................
40. Medical attendant (new) ....
41. Change of address ....
42. Result ....
43. General remarks...................................

The above form is filled in by the Assistant Medical Officer who has visited the case, and the answers given by him are treated as an indication of what further action is required.

Such steps as may be thought necessary are then carried out with the aid of the twenty-eight sanitary inspectors attached to the City Sanitary Department, and of nineteen Health Visitors belonging to two voluntary organisations—the Manchester and Salford Ladies' Health Society, and the Jewish Ladies' Health Society, both of which are aided by the Corporation. With the assistance of these Health Visitors, and occasional visits by the Assistant Medical Officers, every effort is made to see that cleanliness prevails, and that the precautions suggested are properly carried out. With regard to disinfection, this is performed, when thought necessary, by the Sanitary Authority, a Sanitary Officer having first visited the house, and filled in a form showing precisely what articles and rooms require disinfection. When such cleansing or disinfection is thought necessary, a request is addressed to the property owner to allow his house to be disinfected at the Corporation's expense. In hardly any cases has the desired permission been refused.

I do not propose to now describe the methods of disinfection adopted, as these can be best dealt with when I come to the subject of the disinfection of houses, which requires a chapter to itself, but I may mention that between March, 1900, and March, 1901, no less than 2,306 houses were cleansed or disinfected under the supervision of the Sanitary Authority.

It will be seen from what has been written above that the Manchester Corporation employ notification mainly as a means of obtaining some control over affected households, with a view to proper precautions being put into force, and for securing the disinfection and cleansing of infected houses. In both these respects Alderman McDougall is of opinion that valuable work has been performed. He admits, however, that the work of supervising the households by means of organised visiting has not been free from difficulty. A number of the Sanitary Inspectors consider that the people resent these visits, but the Lady Health Visitors do not seem to have much complaint to make on this score. The conclusion the Alderman has come to is that the work would probably be more satisfactorily carried out by a special staff of women. Even as matters are, however, the Alderman is convinced that the supervision has prevented much personal infection, and gone far to inculcate sanitary habits.

But the points mentioned do not exhaust the uses to which the notification system is put at Manchester. It is found of much value in obtaining sanatorium treatment for suitable cases, and also hospital isolation for advanced patients, whose home circumstances render them probable sources of infection. The latter matter is thought to be of very great importance, and is now engaging the attention of the Corporation. At present, use is made of a small home, three miles from the city, to which persons in the last stage of consumption are sent, it being understood by their relatives that they are taken there to die. It is worth noting in this connection that the management of the home are confronted with the difficulty that many of the patients removed there, instead of dying, proceed forthwith to improve!

Alderman McDougall is of opinion that isolation consumption hospitals should be provided by Sanitary Authorities. He thinks, however, that care should be taken to keep any taint of pauperism from the patients.

Another direction in which the notification system has been turned to good account in Manchester is the acquisition of information concerning the modes in which infection is conveyed. With the valuable assistance of Professor Delépine, Dr. Harold Coates, and other medical gentlemen in the service of the Corporation, an endeavour has been made to ascertain the relative influence and virulence of the various sources of infection. Dr. Coates has directed his attention mainly to the detection of the presence of infective material in the dwellings occupied by consumptive persons, largely repeating the investigations made by Dr. Cornet. The results of his researches have been embodied in a paper read before the Congress, to which I shall refer in another place. This part of the question, therefore, need not now detain me.

With regard to the influence of personal habits, occupation, association with consumptives, etc., a large mass of statistical information has been obtained. It will have been noted that the form I gave above contained many questions bearing on these points. A good deal of light has also been thrown on the hygienic condition of many of the factories and workshops in the city, by observing in which ones cases of consumption are most frequently to be found. Several establishments have already attracted attention as having evil reputations in this respect. It is obvious that information of this sort must be of considerable assistance in the work of sanitary administration. Limits of space prevent me from quoting at length from the statistics as to modes of infection appended to Alderman McDougall's paper, but the following summary may be given:—Of the 1,785 cases notified up to December, 1900, the probable source of infection has been determined in 731 cases as follows:—

Patients who lived with a consumptive person	405
Patients who were intimately associated with a consumptive, though not living in the same house	124
Apparently infected in workplaces	97
Apparently infected by milk	10
Living in a previously infected house	5
Infected in public-houses	3
Cases where exposure to infection has been at a period rather remote, but not so remote as to preclude infection having occurred	87
Total	731

In the remaining 1,054 cases it was not possible to arrive at any definite conclusion as to the source of infection.

The opinion at which Alderman McDougall has arrived, as the result of his experience of the working of the system at Manchester, is that voluntary notification, though imperfect, allows much useful work to be done in instructing consumptives and their relatives in cleanliness, in removing sources of infection, in tracing the modes in which phthisis is propagated, in maintaining a sustained control over infected households, and in defining the spheres of usefulness of sanatoria and isolation hospitals.

I may add that systems more or less similar to that at work at Manchester have been adopted by Liverpool, Brighton, and Sheffield.

With regard to the Metropolis, I may mention that Dr. F. H. Alderson, Delegate to the Congress from the Kensington Royal Borough Council, made some interesting remarks on the experiences of that Borough in connection with notification and disinfection. Dr. Alderson brought the question of taking some active measures against the spread of consumption before the Kensington Vestry in 1899, and it was consequently decided to circulate a leaflet, pointing out the necessity for the disinfection of houses, clothing, etc., which had been used by a consumptive person. It was stated that the Vestry would carry out disinfection free of charge in cases where the relatives of the patient were unable to pay. Although this pamphlet was distributed in considerable quantities among medical men, nurses, clergymen, district visitors, etc., with an intimation that more leaflets could be obtained on application at the Town Hall, there was very little demand for them, and very few applications for disinfection. As a result, in part, of his experience in Kensington, Dr. Alderson is of opinion that a single distribution of pamphlets, together with a system of voluntary notification by medical men, without the payment of a fee, is not likely to be very successful. He is of opinion that disinfection should be offered in all cases free of charge, as under the Infectious Diseases (Notification) Act, that there should be a series of distributions of leaflet No. 1 of the National Association at regular intervals, and that the voluntary certificates should be paid for by the Sanitary Authority. Dr. Alderson also expressed the opinion that the education of the public is the best way of bringing about voluntary notification.

CHAPTER VIII.

The Infectivity of Dust.

ONE of the most important agents in the spreading of tuberculous infection is the presence in dwellings of infective dust. Unless a house inhabited by a consumptive is kept scrupulously clean, and every care taken to secure the complete destruction of sputum, it is almost certain that appreciable quantities of dust infected by tubercle bacilli will accumulate. That the presence of such dust is a frequent cause of infection was first clearly demonstrated by Dr. Cornet, some eleven years ago, and since then his conclusions have been confirmed by a number of other investigators, notably Dr. Biggs, of New York, and Dr. Harold Coates, of Manchester, to whom reference was made in the last chapter. The latter gentleman contributed to the Congress an interesting account of his exhaustive inquiries as to the presence of infected dust in the dwellings of consumptives, and as it is of great importance that the necessity of keeping such houses scrupulously clean should be fully realised, I will endeavour to put before my readers, as briefly as possible, the principal statements in Dr. Coates' contribution.

On the suggestion of Dr. Niven, the able Manchester Medical Officer of Health, Dr. Coates, his Senior Assistant, took advantage of the establishment of voluntary notification in that city to undertake an investigation into this subject. The houses which were made the objects of these inquiries may be classified into three groups:—(1) Houses in a dirty condition, in which there was living a consumptive patient, who took no precautions as to the disposal of his sputum; (2) houses in a clean condition, but in which there was a consumptive patient who took insufficient care as to the disposal of his sputum; (3) very dirty houses, but in which there had been no cases of tuberculosis for some years. Samples of dust were taken from the walls, floors, shelves, mantelpieces, etc., either by means of a sterilised metal spatula, or by vigorous rubbing with a piece of sterilised cotton wool. The dust so collected was conveyed in glass tubes to Professor Delépine's laboratory, minute precautions being taken against the possibility of its being infected after collection. An attempt was made to discover the presence of tubercle bacilli by both microscopic examination and culture, but with very little success, the latter method being ineffective through the fact that the dust contains many other organisms, which outgrow the more slowly-growing tubercle bacilli. It was, therefore, found that the only reliable way of testing the infectivity of the dust was by inoculating it into guinea pigs, these inoculations being carried out by Professor Delépine or his assistant. Even this method, however, did not always lead to conclusive results, as many of the animals fell victims to other disease-producing bacteria contained in the dust a very short time after inoculation, and before tuberculosis could be fairly developed. Nevertheless, on the whole, the results arrived at may be regarded as clear and unambiguous. Taking, first, infected houses in a dirty condition, of which twenty-one are reported on in Dr. Coates' paper, it was found that in thirteen cases at least one of the animals infected with dust from the house became tuberculous; while in another case tubercle bacilli were proved to be present in the dust. Thus, in fourteen out of the twenty-one houses, the existence of infective dust, which had at one time been suspended in the atmosphere, and could have been inhaled, was demonstrated. In the case of the other seven houses, there was no proof that the dust was tuberculous. It will be seen that the proportion of houses in which infective dust was found was over 66 per cent., and it must be borne in mind that some of the numerous animals which died within two or three days after infection would quite probably have developed tuberculosis if they had lived for a longer period. One very notable fact was clearly demonstrated during this investigation—the great influence of fresh air and sunlight in destroying the bacteria. While the amount of cubic air-space, taken by itself, did not appear to be of very great import one way or the other, the average space in the rooms from which tuberculous dust was taken being actually larger than in those the dust of which was non-tuberculous, the conditions of lighting and ventilation were found to have exerted considerable influence. Of the fourteen houses which yielded infective dust, the lighting and ventilation were bad in eight, fair in one, and good in only five; of the seven which gave no evidence of tuberculous dust, six were good in both respects, and one was fair. Dr. Coates infers from these figures that, even in dirty houses, all the twenty-one coming under this description, the risk of infection may be largely lessened if the conditions are favourable to the beneficial action of light and air. It may also be noted that Dr. Coates found that the greater part of the infected dust was taken from within one or two feet of the floor.

Turning now to clean houses, inhabited by consumptives who were somewhat careless as to their sputum, Dr. Coates states that ten such dwellings were examined. Twenty guinea pigs were inoculated, but three died shortly after inoculation, so only seventeen were available for the purpose of the test. Of these six developed tuberculosis, and eleven showed no signs of the disease when examined, *post-mortem*.

The dust inoculated into the six animals in which tubercle was found came from five houses, so that, even of these clean houses, 50 *per cent.* contained infected dust, thus showing that carelessness in the disposal of the sputum may effectually neutralise cleanliness in other respects. In Dr. Coates' words, "Ordinary cleanliness alone is not sufficient to prevent the accumulation of infectious material in the rooms occupied by a consumptive." In the five houses where the dust was not infective, the lighting and ventilation were good in every instance; while of the five which yielded tuberculous dust, only one was good in these respects.

Having thus demonstrated that infective dust is very frequently present in houses, whether dirty or clean, which are, or have been, inhabited by consumptives, Dr. Coates set to work to ascertain whether the tubercle bacilli were largely present in the dust of houses which, however dirty, have not sheltered tuberculous patients. In other words, he sought to test the accuracy of the view which some authorities maintain, that the tubercle bacillus is almost universally present in both the air and the dust of houses and other places. The previous investigations of Dr. Cornet had gone some way to throw doubt on this theory, but he had not dealt very exhaustively with this branch of his inquiry. Dr. Coates, therefore, set himself the task of examining a number of very dirty houses with defective lighting and ventilation, and containing plenty of dust and dirt, but having no history of tuberculosis. Great care was taken to ascertain that no person suffering from any form of tuberculous disease, or even from bronchitis or lung affection of any kind, had ever lived in them. Eventually, ten houses were selected as the most suitable for investigation. The dust from them was inoculated into twenty guinea pigs, of which six proved useless for the purpose of the inquiry, as they died a few days after the inoculation. The remaining fourteen, which were killed four to five weeks after inoculation, were all found free from tuberculosis.

Thus it will be seen that, whereas dirty houses or clean houses inhabited by consumptives yielded tuberculous dust in the proportion of from 50 to 60 per cent., none whatever was found in houses, however dirty, which had not accommodated tuberculous patients. The obvious inference, of course, is that it is from the consumptive person that the virulent ingredients of the dust are derived. Dr. Coates' investigations, however, go some way to show that tuberculous dust does not exist as largely as some people suppose in places of public resort, to which consumptives may have occasionally been. He examined samples of dust from various public places, such as the walls of the waiting-room of the out-patients' department of the Manchester Hospital for Consumption, the waiting-room of a large general hospital, railway carriages, and a railway station waiting-room. Only in the last instance was tuberculosis developed in the animals inoculated with the dust.

Before leaving the question of the infectivity of house-dust, it should be added that observations made by Dr. Biggs, of New York, and others, go to show that adjoining houses tend to become also infected, one house apparently receiving infection from the other. An explanation suggested is that so much infective dust is accumulated in an infected dwelling that, when swept out, it is able to infect persons living in the next house. This subject is about to be made the subject of special investigation at Manchester by Dr. Niven and his medical staff.

CHAPTER IX.

The Disinfection of Infected Houses.

SINCE, as has been seen, it is now a well-established fact that tuberculosis is frequently spread through the medium of infected dust or other material in dwellings which are, or have been, occupied by consumptive patients, it is obviously a matter of great importance that all such rooms or houses should be thoroughly and effectually disinfected. There can be no doubt that the too frequent neglect to disinfect dwellings used by consumptives, before allowing them to be occupied by other persons, has been responsible for a very considerable proportion of the unfortunate victims of the disease. Nowadays, public opinion is beginning to be awakened to the reality of this danger, and the various branches of the National Association for the Prevention of Consumption, as well as several Municipal Sanitary Authorities, are already taking steps to secure the adoption of disinfective measures wherever necessary. There is, however, a vast amount of ignorance and apathy to be contended with, and the work of educating the public mind on the subject cannot as yet be regarded as having more than commenced. But it is not sufficient to merely make people realise the necessity of disinfection; it is equally important that the modes of disinfection employed shall be really efficient. On this point many experiments and investigations have been carried out of recent years, and many different drugs and substances have been recommended as disinfectants. To go through all the different methods of disinfection which have been put forward would be merely to confuse the reader's mind, and I will, therefore, confine myself to noticing the remarks contained in a report drawn up for the Council of the National Association for the Prevention of Consumption by three Officers of Public Health, and in the paper contributed by Dr. Coates, of Manchester, who has had exceptional opportunity of ascertaining the efficiency of various methods of disinfection. I will take first the National Association report, which thus sums up the principles which should underlie any system adopted:—

(1) Gaseous disinfection, or fumigation, by whatever method practised, is inefficient for the disinfection of rooms.

(2) The disinfectant must be applied direct to the infected surfaces of the rooms.

(3) The disinfectant may be applied by washing, brushing, or spraying it on.

(4) As a disinfectant for this purpose, a solution of chloride of lime, of 1 to 2 per cent. strength, is satisfactory and efficient.

(5) A thorough wet cleansing of infected rooms is most important.

(6) Bedding, carpets, curtains, wearing apparel, etc., should be disinfected in an efficient steam ventilator.

These general principles are elaborated in the paper by Dr. Coates, who gives an interesting account of the methods adopted by the Manchester Sanitary Authority, and of experiments by which their efficiency has been proved. In cases where the houses are dirty, or there is likely to have been a direct soiling of the walls, floors, etc., the mode of disinfection is one recommended by Professor Delépine, as the result of a number of experiments which he carried out a few years ago. The disinfectant employed is a solution of chlorinated lime, of the strength of 1½oz. to the gallon. The wall-paper is thoroughly saturated with this solution, applied with a soft brush, and is afterwards stripped from the walls. The latter are then washed over several times with the solution, and the floors and ceilings are similarly treated. Any articles of furniture which can be thus dealt with are likewise washed over. Articles of clothing, bedding, etc., are taken away to be disinfected in the steam disinfector.

With regard to the efficiency of disinfection by chlorinated lime, Dr. Coates states that he has tested this by various experiments. The following is an interesting example. Some pieces of sterilised paper were infected by smearing them with tuberculous sputum, and allowed to dry in the dark. They were then pinned to the walls and doors of a room about to be disinfected. After the disinfection, which was carried out in the manner described above, the papers were allowed to dry, and were then rubbed up with sterilised water into an emulsion, and inoculated into guinea pigs. Dirt and dust were also collected from crevices in rooms which had been disinfected, and inoculated into other animals of the same kind. In not a single case did the *post-mortem* examination of the guinea pigs reveal any indications of tuberculosis. On the other hand, animals inoculated from portions of the paper which had not been disinfected, all showed well-marked tuberculous lesions.

It was therefore clear that paper, so infected as to be capable of communicating tuberculosis to the guinea pigs, had been rendered inocuous by being treated with the chlorinated lime.

It is not, however, always considered necessary to have resort to the above method of disinfection. If a house is in a clean condition, and it is certain that there has been no direct soiling of the walls, or floors, with sputum, so that it is only dried dust that has to be feared, cleansing by dough, as recommended by Esmarch, is employed. The wall-paper is rubbed well with the crumb of bread, or with dough kneaded to a proper consistency. The floors, painted walls, and woodwork are washed with soap and water, and the ceilings are lime-washed. It was found, by examination of five houses which had been cleansed in this way, that practically all the dust had been removed from the rooms, so that little or none was obtained by subsequently rubbing the wall-paper with a sterilised sponge. The process, however, necessitates a good deal of care and patience, as it takes a considerable time to properly rub down a fair-sized room, and much caution is requisite in seeing that all dust is removed from angles and corners. If the paper has been directly soiled with sputum, rubbing with dough is useless, as the mucus causes the dried sputum to stick tenaciously to the paper in spite of repeated rubbings. Dr. Coates has, in fact, on several occasions obtained cultures showing abundance of tubercle bacilli from pieces of paper, soiled with sputum, which had been cleaned with dough. Where there is only dry dust, the dough cleansing is quite efficient, and Dr. Coates recommends its periodical employment on the walls as an excellent means of keeping rooms in a clean and healthy condition.

It should have been said, with regard to the use of chlorinated lime, that if the solution is not stronger than 1½oz. to the gallon, its use is attended with practically no discomfort to those who have to carry out the disinfection.

Izal, which is a milky, non-poisonous emulsion derived ultimately from coal (but not from coal tar), has been very successfully employed for the disinfection of rooms occupied by consumptives, infected articles of clothing, etc. Professor Delépine, in conjunction with Dr. Coutts, has tested its efficiency for this purpose in a number of searching experiments, and his conclusions are of a very favourable nature. He found that in the case of paper covered with dried tuberculous sputum, the bacilli were completely destroyed as a result of steeping the paper in diluted Izal for forty-five minutes, and other severe experiments were equally successful.

Professor Delépine has summed up his experience of this disinfectant in the following statement: "As an antiseptic it is more powerful than carbolic acid, and, if it is remembered that it causes very little irritation of living tissues, that in moderate doses it is not poisonous, and that, practically speaking, it is not volatile, there can be little doubt as to the immense advantages which Izal possesses over carbolic acid in many directions." One in 200 is the strength of Izal generally employed. Its internal use was set forth by Dr. Colin Campbell at the Congress. (See page 119.)

It may be added that efficient and agreeable disinfectants are provided by the preparations known under the name of "Sanitas." They contain the active principles (camphoric peroxide, etc.) of the volatile emanations from pine and eucalyptus trees, and have a strongly destructive effect upon pathogenic organisms, including the tubercle bacillus. The value of "Sanitas" fluid and oil is enhanced by the fact that they are non-poisonous, and have a pleasant odour. The fluid is intended for use in the disinfection of rooms, while the oil is of value for inhalation. (See page 124.)

CHAPTER X.

The Influence of Climate.

THIS is a question on which there has been a remarkable change of opinion during the past quarter of a century. Until quite recent years it was very generally held that climate had a very marked influence on consumption. In fact, certain parts of the world, notably South Africa and the Alpine districts of Switzerland, gradually acquired the reputation of possessing climates which were little less than specifics for the disease.

Of late years various causes have led to these views being very considerably modified. So many very diverse climates have from time to time been advocated by competent medical men, often with a substantial substratum of facts to support them, that it has become evident that no one form of climate has a monopoly of beneficial influence on the disease. When it is found that excellent results in the treatment of the malady have been obtained in such varied conditions as those obtaining in South Africa, among the Alps, in Egypt, and in the Isle of Wight, to name only a few of the parts of the world whose claims have from time to time found zealous advocates, it is clear that it is not in local peculiarities of climate that a specific for consumption is to be found. As Professor Clifford Allbutt remarked in his contribution to the Congress, "We have learnt that there is no specific for phthisis—not even climate; that to speak of the best climate for phthisis is to speak in vain. For scrofulous children the best climate is that of the sea; for the adult, in the third or fourth decade of life, the Alpine climate, less windy than the sea, even more tonic, and perhaps having some virtue in its rarity and dryness, may be the best; the elderly must be content with a milder and more equable resort." In other words, there is no climate which is uniformly beneficial. A district which may admirably suit one patient may be positively detrimental to another. On the other hand, there are certain conditions, such as clear, pure air, good dry soil, and absence of damp in the atmosphere, which may be regarded as always advantageous, and it is now becoming generally recognised that, if they can be obtained, it is not of paramount importance in what part of the world the patient undergoes his treatment. In this connection I may again quote from Professor Clifford Allbutt, who, after remarking that there is no best climate even for those who can go where they please, proceeded as follows:—"Sun is an amenity, and a cordial, but does not contribute directly to the cure. At Davos Platz patients do as well in the winter months as in the brighter months. Gabrilowitch, at Halila, took out the reports for the winter six months and compared them with the summer six months, and found that the winter patients did considerably better than the summer patients, the bracing air of winter, despite less light, being more restorative. The most general terms in which the influence of climatic conditions can be put is that the coldest air which he can tolerate, if dry, still, and clear, is the best for the patient, as it calls for more food, and thus best stimulates the appetite. But an air so cold as to be most bracing to a patient of thirty-five would shrivel up a patient of fifty-five. In any fresh and open air a naturally good eater soon regains appetite."

One important result of the modification in the general opinion as to the influence of climate is that patients are being more and more largely subjected to sanatorium treatment in their own countries, instead of being exiled to localities supposed to be specially favoured from a climatic point of view. It is now generally recognised, for instance, that, provided proper care is taken in the selection of a suitable neighbourhood, there is no reason why English consumptives should not undergo the open air cure in their own land with every prospect of success.

A striking instance of the present tendency of opinion is furnished by the case of Holland. For years, as was pointed out in a paper by Dr. R. de Josselin de Jong, of The Hague, it was considered useless to build sanatoria in such a low-lying country as the Netherlands, and Dutch patients who desired sanatorium treatment had to go to Davos Platz, or other foreign resorts. Nowadays, it is known that the treatment can be quite satisfactorily applied in the inland districts of Holland, and the erection of sanatoria there is now being energetically promoted.

It has already been said that a damp atmosphere is generally prejudicial to consumptives, and it may be added that some light was thrown on this subject by a paper by Dr. W. Gordon, of Exeter, on "Wet Winds and Phthisis," which contained the results of some investigations carried out by him at Okehampton, in Devonshire, from which he draws the inference that the death-rate from phthisis in that locality can be largely accounted for by the influence of exposure to the west and south-west winds.

I may say, in conclusion, that Professor Clifford Allbutt is of opinion that, in England, Kent, Norfolk, and Suffolk offer the best conditions for the treatment of consumptives.

CHAPTER XI.

The Dieting of Consumptives.

IN 1866, Dr. Henry Bennet wrote of the doctors of the time that they did not dare to apply to their consumptive patients the ordinary rules of hygiene, to give plenty of animal food, or to expose them to fresh, cool air night and day. These words aptly illustrate how much opinion has changed since those days. Fresh air and abundance of solid food are now regarded as essential conditions in the treatment of consumption. It is generally considered that sufferers from this disease require more food, and at shorter intervals, than normal persons, and one of the main points in the prevalent mode of treatment is the encouragement of the patient to consume as much nourishing food as he can comfortably assimilate. Indeed, there is reason to suppose, from facts mentioned in some of the papers contributed to the Congress, that there is in some quarters a tendency to overtax the patient's digestive powers by forcing him to take more food than his system can stand. This practice was condemned by several of the speakers, who, while approving the supply of nourishment in quantities larger than would be requisite for an ordinary person, insisted that the personal idiosyncracies of the patient should be taken into account, and the quantity of food strictly regulated by the capacity of his digestive organs.

The general principles underlying the dieting of consumptives were well dealt with in papers by Dr.

Samuel Bernheim, of Paris, Dr. Malibran, of the Gorbio Sanatorium, and Professor Clifford Allbutt, and I will briefly summarise some of the leading points contained in these contributions. Dr. Bernheim laid great stress on the influence of restorative feeding, but urged that it should not be blindly put into practice. It is not sufficient, he said, merely to speak to a tuberculous patient and to order him to eat often and much, and to take a very rich diet. Instead of imposing so vague a regimen, an exact account should be taken of the digestive powers of the patient, with a view to discover whether there is a defect or excess of acidity, or excessive dilatation, etc., and a diet should be prescribed in accordance with these indications. After passing a number of foods under review, and discussing their richness, or the reverse, in nitrogen and mineral salts, Dr. Bernheim summed up the question by stating that, if the tissues and the debilitated organism are to be repaired as speedily as possible, it is imprudent to exact any considerable effort on the part of the stomach at the commencement. This organ, he says, should be protected with "pious care," and not be brutally overworked. No good is served by putting inside a patient an enormous quantity of food. What is necessary is to give him nourishment that he is capable of digesting and assimilating. By commencing this nourishment prudently and methodically, the stage when the stomach of the patient is tempted is gradually arrived at, and the patient finishes by taking his food of his own accord with relish and benefit.

Dr. Malibran, of the Gorbio Sanatorium, expressed similar views as to the necessity of proportioning over-feeding to the capacities of the digestive organs. The tubercular patient, he said, should eat sufficient to regain his lost weight, and to compensate for nutritive outlay, but nothing is gained by acquiring a florid aspect at the cost of a dyspepsia which will occasion a fresh and irreparable emaciation, and compromise recovery from the tuberculosis. At Gorbio food is placed at the disposal of the patients in excess of what they can take, but they are not forced to transgress the limits of their appetites.

Professor Clifford Allbutt was also emphatic as to the dangers of pushing over-feeding to an excess. As in other diseases, so in phthisis, he remarked, the first task in undertaking a cure is to clear up arrears. "When the patient comes under care, in most cases at any rate, he has drifted into physiological debt. Now our first duty is to straighten the account, and it is astonishing how much can be done by reducing expenditure, by husbanding the profits, and by clearing off arrears. Every patient, febrile or not, should rest for ten days or so, until the physician can reckon up his balances. And let it not be forgotten that the stomach needs rest too, that is, economical management. To thrust a heap of food into the stomach of a worn and exhausted machine is to court failure." Professor Allbutt went on to urge that records of the dimensions of the stomach before and after meals should be carefully taken, and then continued as follows: "For the first few days let the rest be all round, stomach included; then, after the varying dimensions of that organ are known, the food may be increased according to the energy of the individual. Another warning I would give is to watch carbo-hydrates (sugar, starch, etc.) with care. Feeble stomachs digest these materials with less activity, and they tend to generate flatulence. Man at bottom is carnivorous." Professor Allbutt also suggested that milk is often given too profusely. The bulk of liquid, he says, has two dangers; first, it impedes digestion by diluting the gastric juice, and distending the stomach—at any rate in non-febrile cases, where liquid is not so quickly disposed of; secondly, it adds to the mass of the blood which the heart, often ill-nourished, has to lift. "For my part," the Professor proceeded, "I rarely find the need of forced feeding; now and then a patient is fastidious, but the secret of forcing the food is to put the patient into open air, as bracing as he can bear, and if the cook is a good one, the appetite, in hopeful cases, will come back of itself." With reference to feverish patients, Professor Allbutt made the following remarks: "Food has two functions to fulfil; to compensate fever, if fever be present, and to nourish the body. Feverish patients will dispose of more liquid than the non-febrile, and as, in them, the stomach is generally relaxed, the food must be in frequent small quantities. Gabrilowitch has shown that in the phthisical, and not in the febrile only, the weight falls with surprising rapidity between meals, if these are at long intervals. This fall he finds best marked at night, between supper and breakfast. It would seem, then, that so long a fast, however wholesome for the sound, is not desirable for the sick. As he epigrammatically puts it, 'irritability and sleeplessness are the hunger of the phthisical.' When fever has disappeared and the patient has regained his normal weight, the physician, by close watching of the scales, will be able to return to ordinary meals at the usual intervals. There will be then no more arrears to make up, only the balance of waste to repair."

With regard to the use of alcohol by consumptives there is very considerable difference of opinion. Perhaps the most prevalent view at present is that expressed by Professor Clifford Allbutt in the following passage: "Of alcohol Bennet well said, 'Even when it is prescribed medicinally, there is always the risk of abuse. It is a double-edged sword.' For a few days occasionally, when the patient flags, when his skin is cool and damp, his pulse feeble, his digestion slow, and when, after meals, he is depressed in spirits, it is helpful. As a rule it is not needed."

Before quitting this subject, it may be useful to mention that the "Lancet" recently conducted an investigation into the properties of "Somatose," a meat preparation in which the albumen of the meat is mainly converted into albumoses. "Somatose" was administered to a number of patients suffering from various complaints, including phthisis, and the conclusions arrived at were summed up by the "Lancet" as follows: "(1) That 'Somatose' is a true meat nutrient, possessing restorative and stimulating powers; (2) That it is well borne by delicate patients; (3) That it improves digestion, and causes no gastro-intestinal disturbances; (4) That it has a favourable effect on general metabolism; and (5) That it has no irritant effect on the kidneys, and that it never gives rise to albuminuria, albumosuria, or peptonuria."

Reference may also be made to the "Lancet's" analytical report on "Casumen," a preparation of the albumen of milk, thoroughly sterilised, and intended to be added in a dry state to most forms of food. "We have not," the "Lancet" remarked, "examined a preparation containing so high a proportion of proteid, and when this is coupled with the fact that this Casein is soluble, it is obvious that the preparation must possess extremely high food value. It readily peptonises, and is, therefore, easily digestible. Soluble Casein may have a very wide number of useful applications, directed chiefly towards raising the flesh-forming value of a number of foods. Considering that it is the flesh-forming constituent of a natural food, and that it is carefully prepared by a special method, it must necessarily be a very powerful and concentrated form of nourishment."

It may be added that when patients are in a febrile condition lime-juice is found to provide a useful and wholesome beverage. In cold weather it has a refreshing effect when mixed with hot water, and during the summer months lime-juice and cold, or mineral, water makes a cooling and agreeable drink.

CHAPTER XII.

Lighting and Ventilation.

IT will be apparent from what has already been said that efficient lighting and ventilation are prime factors in preventing and combating tuberculosis. "Sweetness and Light," to use Dean Swift's famous phrase, are deadly enemies to the tubercle bacillus. It cannot maintain its vitality in the presence of fresh air and sunshine, while, on the other hand, it flourishes mightily where darkness and lack of air prevail. In fact, it is not too much to say that it is in an abundance of light and good air that the main safeguards against the disease are to be found. It has been proved, over and over again, that it is in badly-lighted, badly-ventilated dwellings that consumption finds its most congenial home, while its power tends to decline in proportion as the opposites of these conditions prevail. These now universally accepted principles have found their most conspicuous expression in what is known as the "open-air cure," with which I shall have to deal hereafter. For the moment, I wish rather to dwell on the importance of lighting and ventilation in their relation to the healthiness of living and workrooms, and all places of public resort. Skilled opinion is, happily, so unanimous nowadays upon these points that there is no necessity for me to refer to more than a very small proportion of the numerous contributions to the Congress in which the questions of lighting and ventilation were discussed.

It will probably suffice if I select for reference the papers contributed by Dr. Robertson, of Sheffield; Dr. Charles Denison, of Denver, U.S.A.; Dr. T. Glover Lyon, of the City of London Hospital for

Diseases of the Chest; Mr. E. T. Hall, F.R.I.B.A.; and Dr. F. Rufenacht Walters, of London.

Naturally, the subjects of lighting, and the provision of fresh air, are to a considerable extent bound up together, but I may commence by summarising some remarks by Dr. Robertson and Mr. Hall, which relate more particularly to the problem of lighting, and will then turn to the kindred subject of ventilation.

Dr. Robertson commences his remarks on this part of the subject by pointing out the potent beneficial influence of sunlight on the disease, and proceeds to urge the desirability of obtaining some more reliable means of ascertaining the sufficiency of lighting than is at present available. The efficiency of the lighting of any house or workplace does not, he remarks, solely depend on the area of window. A film of tar or soot on the windows may cut off nine-tenths of what he terms the "photographically active light"; a dark stone or brick building adjacent to a house will absorb nearly twice as much light as a light coloured one, thus proportionately reducing the brightness of the light which penetrates to the room. At the present time, in his opinion, a very large proportion of the houses and working-places in our large towns are defectively lighted, owing to the fact that they are so closely assembled that they cut off the light from one another. The only remedy is to insist in the future that towns shall spread out much more than they do at present, so that each building shall have a larger space round it for the conveyance of light. He also urges that no cellar dwellings should exist, and that no cellars should be allowed to be used as workplaces. The injurious effect of dark houses and workshops, especially upon the young, is, he states, remarkable, and he contends that there is absolutely no reason why workers should be allowed to be injured in this way. Unfortunately, as Dr.

Robertson points out, the difficulty at present of establishing any standard of what constitutes sufficient lighting, owing to the lack of any good means of measuring light, makes it by no means easy to adopt any practical measures to enforce the adequate lighting of dwellings and workshops. What is wanted, he says, is a means of being able to say that a particular house or workplace is insufficiently lighted. Some amount of attention has been paid to the subject recently, but no recognised apparatus for determining what proportion of available light a room actually receives has yet been devised. Until this want is supplied, he doubts if there will be much improvement on existing conditions of lighting. Dr. Robertson concludes his observations by pointing out that the influence of light in the prevention of tuberculosis is more indirect than direct. Absence of it brings on anaemia, and a whole train of consequences which diminish our powers of resistance and general well-being. Poorness of light also has an evil effect in preventing dust and dirt from becoming apparent, thus diminishing the likelihood of their being removed.

Mr. Hall, in his paper on sanatoria, which will be more fully dealt with hereafter, also emphasises the desirability of buildings having an ample space around them for the admission of sunlight, particularly on the south side. The curative value of sunlight, with its germ-destroying power, is, he says, immense. Moreover, the sense of confinement produced by a house being shut in, whether by trees or other buildings, is very depressing to all persons of nervous temperament.

The subject of ventilation is not an easy one to deal with. Of late years so much attention has been paid to it by sanitarians, and so many diverse systems and apparatuses have been devised, that it would require a bulky volume to do justice to even a small proportion of what has been written and invented on this important question. There are patent devices, of more or less ingenuity, almost as numerous as the leaves in Vallambrosa, and pretty well every hygienist has his own pet theory on the subject. It has seemed to me, therefore, confronted by this *embarras de richesse*, that I shall best consult the interests of the reader by not attempting to enter into the technical details involved in the mechanical problems with which the question of artificial ventilation is beset. I propose simply to deal with some of the general principles as to the regulation of the supply of fresh air as discussed in some of the numerous contributions to the Congress which bore upon the subject, and I shall refer more particularly to the ventilation of private dwellings, workshops, and places of public resort, leaving the questions connected with ventilating hospitals and sanatoria to be treated when I come to the chapter assigned to the subject of sanatoria. Perhaps I cannot do better than commence by citing the elementary but excellent advice to private house and factory occupiers contained in a very useful little leaflet, "Fresh Air and Ventilation," which is being widely circulated by the National Association for the Prevention of Consumption. The information and suggestions therein contained may be summarised as follows:—In order to prevent the development and spread of consumption, fresh air and proper ventilation are essential in factories, workshops, and offices, particularly where the work carried on is associated with gaseous fumes or fine dust. The better the ventilation the greater the worker's power.

The breath from the lungs contains foul and poisonous organic matter, and if the air into which this organic matter is breathed is not quickly removed from living and sleeping rooms, factories, public halls, etc., the foul air is breathed again, and so poisons the blood, thus causing headache, nausea, loss of appetite, anæmia, and chronic ill-health, predisposing to consumption and other diseases.

When a room, on being entered from the open air, smells close and stuffy, the air it contains is not fit to breathe, and fresh air must be introduced.

Windows should be made to open to the external air, and should be kept open day and night, unless this is forbidden by the medical adviser.

A free supply of fresh air may be secured by opening the window at the top, or by opening the bottom sash about four inches and inserting between the window frame and the sill, a piece of wood the whole width of the window, so that the air enters in the former case at the top of the room, and in the latter case between the sashes at the middle of the window, and in an upward direction.

Back-to-back houses and cellar tenements are unfit for human occupation.

Every room, especially if used for sleeping in, should have an open fireplace.

Never block up the fireplace or the chimney. If there be a register, never close it.

Rooms, especially bedrooms, and staircases, and passages should be frequently flooded with fresh air by throwing open all the windows and doors. This is particularly necessary after crowded gatherings in churches, schoolrooms, theatres, etc.

The air in a room can never be pure if the room is dirty.

The air in a room requires renewing after being rendered impure by the burning of gas or oil for lighting, heating, or cooking.

Turning now to some of the Congress papers in which this subject is dealt with, I may refer first to a contribution by Dr. Rufenacht Walters, in which he insists that present standards as to what constitutes efficient ventilation are much too low. In text-books on hygiene, he observes, it is usually stated that rooms containing not more than two parts in 10,000 of respiratory CO_2 (carbonic acid gas) may be regarded as well ventilated. As many bedrooms and sitting-rooms in our towns and villages do not even come up to this standard, we may, perhaps, he says, regard with complacency those which do, but he urges that this standard is not high enough, at any rate, as far as consumptive patients are concerned. He has satisfied himself that it is perfectly possible, by natural ventilation, to maintain the air of a room in a state of purity approaching that of the open air, and he thinks that the air supply should not be considered satisfactory for consumptives if more than one part in 20,000 of respiratory carbonic acid gas is present.

Testing the air of a small private house bedroom, of 1,100 cubic feet, he found that, by keeping open three windows (15 square feet), the chimney being open but the door shut, the proportion of the gas present after a night's occupation by one person was only a little above the proportion suggested above as satisfactory. In the case of a sanatorium bedroom, of similar proportions, inhabited for many days and nights in succession by a feverish patient, he obtained still more satisfactory results, the proportion of the gas being kept well under the above standard, or not perceptibly different from that of the air outside. In this case, an air-shaft into the open air took the place of a chimney, the window space was 32ft. square, and a door 18ft. square was kept constantly open and in communication with the outer air. Of course, such conditions as these are hardly obtainable in private houses, but Dr. Rufenacht Walters' observations are, nevertheless, of value, as showing that the proportion of carbonic acid gas in the air of living and sleeping rooms can be very substantially reduced by a plenteous use of natural ventilation. I should add that Dr. Walters' paper will be referred to more fully when I come to the subject of the open-air cure.

Dr. Robertson, of Sheffield, in the contribution I have already drawn from on the question of lighting, expresses the opinion that very considerable difficulty will be experienced in improving the means of ventilation in dwelling-houses, much though he thinks this is needed; but he considers that a much larger amount of fresh air from which to draw the supply to dwellings could be obtained by abolishing the large number of obstructive buildings to be found in large cities. It is probable, too, that a great deal can be done in the way of improving the air supply to factories and workshops. There is difficulty, he says, in quite understanding why the small increase of carbonic acid, and other impurities, which occurs in a badly-ventilated room, should have such a powerful influence for harm, but that it has such an effect cannot be doubted. Dr. Robertson considers that the present cubic air-space permitted by statute in factories and workshops is much too small for efficient ventilation. In this country, he says, reliance has to a very large extent been placed upon window ventilation, with the result that in many workshops the workers have to carry on their operations immediately under an open window, and in cold weather frequently complain of draught when the window is open. He urges that special inlets should be relied on more than windows, and is of opinion that inlets of the type of the Sherringham valve are among the best. Looking at the question as a whole, Dr. Robertson expresses the conviction that the only way to ensure proper ventilation is to enforce a standard of purity of air. It would then devolve upon the occupiers of workshops to see that ventilators were kept in working order under all conditions. The adoption of such a standard, which should be a high one, would, he contends, be an enormous improvement on any standard relating to the amount of inlet and cubic space. The chief difficulty in the way lies in the very various methods which are at present used for the estimation of the amount of carbonic acid in the air.

Dr. Glover Lyon's paper on the "Air Supply of London" takes a rather pessimistic view of existing conditions. When Queen Victoria came to the Throne, he remarks, the general supply of air to London was perfectly good, and country air could be enjoyed within an easy journey on foot by all Londoners. Whereas, at the beginning of Edward the Seventh's reign, pure air is unattainable by the majority of His Majesty's subjects dwelling in his capital. The provision of much larger open spaces, within easy reach of all, is, he thinks, imperative. He considers that zones of houses should be built next to the open country, and for every house built or rebuilt adequate park space in near proximity to it should be provided. These open spaces would suffice to provide good air, as far as the suburbs are concerned, but he thinks that forced draughts of air, as suggested by Sir W. Preece, may be found necessary for the central part of London. As to individual buildings, Dr. Lyon considers the present regulations quite inadequate. Many modern mansions are, he declares, practically collections of back-to-back houses, with less air supplied to them than prisons and workhouses. This is an increasing evil, but might be considerably mitigated by the use of ventilating fans. The present supervision of the ventilation of buildings is, he thinks, of no account, and he urges that Medical Officers should be given control of the matter. He proceeds to advocate the splitting-up of large buildings into proper ventilating units. At present the lower parts foul the air of the upper parts, and the windward side fouls the leeward. Ventilation regulations ought not, in his opinion, to refer, as is now the case, only to floor-space, area of openings, and air-space. Rules should be added as to the quantity of air supplied, and the proper distribution of inlets and outlets. Dr. Lyon concludes by making the following suggestions:—

(1) That regulations should be drawn up for the adequate provision of open spaces in the building and re-building of large cities.

(2) That, in the case of schools and public assembly rooms of all kinds, provision should be made to admit a standard quantity of fresh air to each person the school or assembly room is intended to accommodate.

(3) That ventilation generally should be under the supervision of the Medical Officer of Health.

Dr. Charles Denison, of Colorado, contributed to the Congress a somewhat technical paper on the degenerative effects of devitalised air as prime causes of tuberculosis. He dwelt on the influence of air which has lost its vitality, due probably to a change in its normal electrical state, in creating in persons breathing it a morbid condition of the constitution, which gradually drifts into degeneration of tissue, the so-called soil of tuberculosis, and urged the need of further experimentation for the purpose of throwing more light upon this matter. He expressed the view that medical men were apt to pay a too exclusive attention to the tubercular germ, and to neglect important predisposing causes which were of almost equal importance. The question of "soil," he urged, is now even more important than that of "seed," and he went on to remark that mankind, under our present civilisation, is very generally tainted with a morbidity of constitution, which has for its cause blood-poisoning, due to devitalised air. The fault lies in the disproportion of breathing space and sun influence to the needs of man, in sleeping, living and working rooms. He suggested that "outdoor" life should be the keynote of the Congress.

CHAPTER XIII.

The French Anti-Tubercular Dispensaries.

WITHIN the past two years the increasing interest in the question of combating consumption has led, in France, to the taking of a very practical and promising step, in the establishment of what are known as Anti-Tubercular Dispensaries. The idea seems to have been conceived in the minds of Dr. Bonnet Léon and Dr. A. Calmette, the Director of the Lille Pasteur Institute, both of whom showed praiseworthy energy and promptitude in getting their suggestions carried into practice. Already dispensaries, such as they advocated, are successfully at work at Montmartre, Lille, Nantes, and other towns, and an influential Association has been formed to promote the foundation of similar establishments. The movement has secured the warm approval of the French Government, and there seems every reason to believe that it will be able to perform a very large amount of useful work. Before giving a summary of two contributions to the Congress in which the work of these dispensaries was described, I may explain that they have been founded with the view of providing an institution in which members of the working classes who have reason to suspect that they are afflicted, or threatened, with consumption may obtain gratuitous examination and advice, and such assistance, both to themselves and their families as may be thought desirable. They are also made use of as centres for the extension of educational information, and for obtaining sanatoria treatment for suitable cases.

With these few words of preface, I may proceed to shortly summarise the more important portions of the paper "On the Function of Anti-Tubercular Dispensaries," contributed by Dr. Bonnet Léon, one of the founders of the movement, afterwards drawing from Dr. Calmette's contribution a more detailed account of the methods adopted.

As, argues Dr. Bonnet Léon, the whole medical world is agreed that tuberculosis is contagious and avoidable, and that it is curable, especially in the early stages, it is advisable that a simple and inexpensive method of action should be adopted, by which the labouring classes, who are always, owing to their wretched homes, the most exposed to the disease, should be gratuitously provided with: (1) Education in methods for the prevention of tuberculosis, to enable them to avoid infection; (2) Medical advice, nursing, and treatment, in as early a stage as possible, when they have contracted the disease; (3) Necessary assistance, especially in the provision of proper food.

Sanatoria, he remarks, are exceedingly costly, they can only deal with an insignificant portion of the population, they do not provide any general education on the subject, and their construction occupies a period of several years. Dr. Bonnet Léon, therefore, felt the necessity of establishing institutions which should undertake the work which sanatoria are not in a position to perform, and in January, 1900, he opened an Anti-Tubercular Dispensary, as he termed the establishment, in the Rue St. Lazare, Paris. Shortly afterwards, it was removed to Montmartre, a very populous and infected district on the outskirts of the French capital. It consists of a small suite of five rooms on a ground floor, very plainly furnished, and supplied with some medical apparata, such as a microscope, a weighing machine, Röntgen Ray equipment, and appliances for inhalation and respiratory exercises. It is lighted by electricity, and the walls and floors are of glazed tiles and parquet, so as to be easily washed. The staff consists of two doctors, two assistants, and an attendant, and the institution opens for consultations, etc., on the closing of the workshops. Although the dispensary has only been such a short time at work, it is already popular and well known, the attendance of patients having been at the rate of 5,000 per year, the majority, as Dr. Léon notes with satisfaction, persons in the early stages of the disease. In addition to examinations, consultations, and the giving of advice, and special instructions, the dispensary has also provided nearly 500 courses of three months' treatment, comprising the supply of meat, muscle-juice, milk, and the provision of rest, and "open-air cure" in the institution, thus securing conditions somewhat similar to those of a sanatorium. Patients have also been visited in their own homes, and precautions taken to ensure their being kept in sanitary surroundings. The cost of maintaining the dispensary has been decidedly small, in comparison to the magnitude of the work accomplished, amounting to not more than 30,000 francs (£1,200) per annum, of which 22,000 francs (£880) was spent in boarding 120 patients for three months, at a cost of about two francs (1s. 7d.) per day. The expenditure incurred in starting the institution amounted to barely 5,000 francs (£200).

Dr. Bonnet Léon estimates that the dispensary system could provide for an initial expenditure of 1¼ million francs (£50,000), and an annual outlay of 7½ million francs (£300,000):—

(1) Consultations and advice on prevention of tuberculosis to more than one million people.

(2) Nursing and treatment for three consecutive months to 100,000 patients.

(3) Rest, extra nourishment, and special treatment for the prevention of tuberculosis to more than three million out-patients.

He therefore contends that, by the adoption of the dispensary system, great numbers of persons who have no prospect of obtaining sanatorium treatment can be economically and efficiently provided for, whereas to attempt to establish sanatoria on such a scale as to accommodate all the members of the working classes in need of treatment would absorb millions of pounds, and take a number of years to be put into working order.

Dr. A. Calmette's paper embodied a description of the Emile Roux Anti-Tubercular Dispensary at Lille, which has been at work since the commencement of this year. In his view, the chief mission of the dispensaries should be in searching out and attracting workers attacked by or suspected of tuberculosis, by means of propaganda in popular centres; in affording them gratuitously consultations and advice for their families, and in distributing food, antiseptics, and spittoons; also in taking steps to obtain the patient charitable relief, so as to permit him to leave off work without reducing his family to want.

At the Lille Dispensary, two consulting physicians, who work gratuitously, are in attendance each morning. The patients generally attend spontaneously, and they go in such numbers that there is often great pressure on the staff. Each new arrival is questioned as to his circumstances and past and family history, after which he is physically examined. If found to be tuberculous, he is given a card entitling him to dispensary treatment, and arrangements are then made for an "inquiry-maker" to pay a visit to his house. This "inquiry-maker" is himself a working-man, as it is found that the patients can be better dealt with by one of their own class. It is his duty to become, as far as possible, the friend and confidant of the persons visited, and to make himself thoroughly acquainted with the requirements of the case.

He is provided with an elaborate inquiry form embodying a large number of questions as to the general and financial position of the family, and the sanitary condition of the house. Having obtained information on these points, the dispensary proceeds to take such action as seems to be necessary, both out of its own resources and in conjunction with charitable associations. For instance, clothing and bedding are taken out of pawn, and in other ways endeavours are made to secure for the patient and his family comfortable surroundings while the illness lasts. Periodically the patient is examined, and, when necessary, medical prescriptions are given him, medicine itself not being supplied by the dispensary. If he is a suitable case, efforts are also made to get him admission to a sanatorium. All patients are likewise provided with pocket and table spittoons, together with a solution of lysol, to be used in them as an antiseptic. Another important matter which the dispensary takes in hand is the washing and disinfecting of patients' linen.

The medical staff consists of six doctors, each of whom is on duty two days a week.

At present they work gratuitously, but it is intended to arrange some scheme of payment as funds allow.

I have dealt in some detail with the organisation of these infirmaries, because the Congress passed a resolution in favour of the establishment of similar institutions in this country, and the particulars given above are, therefore, of more than merely academic interest.

CHAPTER XIV.

The German Workmen's Insurance System and Consumption.

HAVING regard to the great interest which has been shown in this country in recent years in questions relating to the maintenance of the aged poor and invalided members of the working classes, it is curious that so little is known here of the great system of compulsory insurance, which has been in force for some years in the German Empire. Still less does it seem to be realised that this system has given birth to the most extensive campaign against consumption which has yet been put on foot. I am only concerned here with that part of the work of the insurance system which relates to the question of consumption, but in order to make clear the aims of the measures which the insurance institutions have adopted, I must first say a word as to the nature of the scheme of compulsory insurance itself.

Under this system, all workmen engaged in industrial pursuits are obliged to insure themselves against sickness, accident, and permanent invalidity, through sick clubs, insurance institutions, and trade associations, all under the supervision of a special Government Department. The necessary funds are provided by contributions from both the workmen and the employers, supplemented by a grant from the State. The proportions of the contributions vary somewhat according to the form of insurance. In the case of insurance against permanent invalidity, the worker and his employer each pay half the contribution, the workman's share averaging about 2d. in the £ of his weekly wage. The Government grants a subsidy of about £2 12s. towards each pension.

Upon being incapacitated by old age or ill-health, the worker becomes entitled to a pension.

The sickness and accident insurances are worked upon similar lines.

The enormous proportions which the system has attained may be indicated by mentioning that nearly 13 million workmen come within its scope, that during the period 1885-97 the workmen's contributions to all three forms of insurance amounted to over £64,000,000, the employers' to a trifle under the same amount, and the State grants to rather less than £5,000,000, a grand total of about £133,000,000, and that the total amount returned to the workers in compensation during the same period totalled over £118,000,000.

Turning now to that branch of the insurance system with which we are more particularly concerned, it must be explained that the insurance institutions through which the invalidity insurance is effected possess the right of undertaking the medical treatment of persons who seem likely to come upon their funds through permanent incapacity to earn their living. The institutions largely avail themselves of this provision, having convinced themselves that it is to their interest to spend money in the attempt to avoid the necessity of providing a permanent pension, or at any rate defer it. Some time ago, the institutions accordingly set to work to ascertain the relative prevalence of the various causes of invalidity among the working classes. The result threw a rather startling light on the enormous responsibility, in this respect, of pulmonary tuberculosis. It was found, for instance, that of the male workers who become incapacitated by the age of thirty, more than a half were victims of this disease. Further, it was estimated that of every 100 persons who die in the German Empire at the ages 15-16, 30 owe their doom to consumption. The institutions, therefore, concluded that it was of the greatest importance to them that the ravages of consumption among the insured workers should be checked. During the past five years they have, accordingly, made efforts in the following directions:—

(1) The provision of sanatorium treatment for insured persons who have developed the disease, particularly those still in the early stages.

(2) The removal to specially-established homes of persons who are likely to become centres of infection if left in their own households.

(3) The dissemination of information as to the disease, by lectures, leaflets, etc.

(4) The extension of financial assistance to the families of consumptive persons, so as to enable the latter to leave off work and obtain sanatorium treatment.

(5) The investment of surplus funds in the erection of sanitary working-class dwellings.

Some of the institutions have erected sanatoria of their own, but the majority prefer to work in conjunction with the various associations possessing sanatoria for the working classes. Altogether, some fifty sanatoria, nursing homes, etc., are now at the disposal of the institutions, and this number is being rapidly increased.

The entire cost of the treatment, including travelling expenses, is borne by the institutions, who, however, obtain some reimbursement from the sick clubs to which the patients belong. This sanatorium treatment is in no way compulsory, the insured workers having the right to decline it, while retaining their claim to an invalidity pension, but the institutions can withhold pensions from persons who abandon the sanatorium treatment prematurely. In the year 1900, no less than 11,094 persons were treated by the institutions, of whom nearly 9,000 were sent to sanatoria. The average duration of a patient's stay in a sanatorium is from 74 to 76 days, the cost averaging nearly £17 per head, or rather over 4s. 6d. per day. The total expenditure in this direction during 1900 was over £188,000.

As to the results achieved, it may be said that, although the hopes of the more sanguine supporters of sanatoria hardly seem to have been realised, the institutions appear to be satisfied that it is to their advantage to maintain, and even increase, the heavy outlay which the scheme involves. One encouraging fact which seems to have been pretty clearly established is that, after the lapse of from three to four years from the completion of the sanatorium treatment, there is very little fear of a relapse. It has also become evident that the effects of the treatment are more often permanent in the case of women than of men.

The provision of isolation homes for incurable cases has not yet reached very large proportions, but a considerable number are likely to be erected in the near future.

The financial assistance of patients' families, which is found to be an indispensable corollary to sanatorium treatment, is receiving much attention. Thus, in 1900, over £28,000 was expended in this way. The improvement of working-class dwellings is also being zealously promoted by the institutions, which have invested nearly £4,000,000 for this purpose.

In the way of disseminating information, much good work is also being done. Lectures are frequently given in populous centres, and several millions of simply-worded leaflets have been distributed. On the whole, it is evident that these insurance institutions, with their *clientèle* of nearly 13,000,000, are able to exercise a very potent influence for good.

The above outline of the working of this very promising experiment has been compiled largely from a paper contributed by Privy Councillor Bielefeldt, of the Imperial Insurance Department.

CHAPTER XV.

Sanatoria and the Open-Air Treatment.

I DO not propose to go at length into the numerous subjects connected with the erection and management of sanatoria which were discussed by the Congress. They are largely of a technical character, and of no great interest or importance to persons not connected with the control or medical direction of these institutions. There is likewise already in existence a great mass of literature dealing with sanatoria from many different points of view, and I do not think I should serve any good purpose by now entering into a consideration of the many controversial questions involved. I therefore propose to simply place before the reader a brief account of the aims which sanatoria are intended to serve, the nature of the treatment which is pursued therein, and the main principles involved in their erection and arrangement.

I may commence with a word as to what is known as the open-air treatment, since this is now a recognised part of the system pursued at practically all consumption sanatoria. This treatment is based on the knowledge which has been acquired in recent years as to the great beneficent influence of fresh air and sunlight both in strengthening and stimulating the constitution, and in reducing the vitality of the tubercle bacillus. It consists in exposing the patient by day and night all the year round, so far as can safely be done, to the outdoor air. He is sheltered from wind and rain, but the outer air, however low the temperature, is allowed free access to him. It is found that if proper precautions are observed, this mode of treatment brings no ill-effects in the form of colds, etc., but, on the other hand, greatly braces the system, promotes the appetite, and is a most powerful factor in combating and destroying the bacillus. It has, perhaps, been most thoroughly applied at Davos Platz, and in other parts of Switzerland, and in Germany, but is now also being generally adopted in France, England, and other countries—in fact, wherever sanatoria have been erected.

At the present time the system of sanatorium treatment may be described as in its infancy. Only in Germany has it as yet been put into force on a really large scale. In that Empire there are now some sixty sanatoria, with a total of 5,000 beds, and their number is being very rapidly augmented. In Great Britain, much less progress has been made, but there are now some fifty institutions, either already at work, or in course of construction, in which the open-air treatment is adopted. They are, however, mostly on a very small scale. Here, as in Germany, the movement in favour of sanatoria is now making great headway, and a rapid increase in their numbers may be expected in the near future.

Speaking broadly, it may be said that a sanatorium for consumption is intended to be an establishment erected and conducted in such a manner as to provide the patient with exactly such hygienic and sanitary conditions and surroundings as will best enable him to struggle against the disease. Scrupulous cleanliness, unlimited light and fresh air, abundance of good food at frequent intervals, complete rest of mind and body, and constant supervision by competent medical men—these may be regarded as the keynotes of the system pursued. Medicine is in most cases used only as a subsidiary agent, and it is to natural forces that the cure of the patient is for the main part entrusted.

The general arrangement and construction of a well-equipped sanatorium may be conveyed by summarising parts of the papers contributed by Mr. E. T. Hall, F.R.I.B.A., and Professor Clifford Allbutt.

The sanatorium should stand south east, and be situated on a dry upland soil. It should preferably be placed on the slopes of an eminence, so as to command views of the surrounding country, and should be at some distance from the main road, especially in a sandy neighbourhood. All the rooms occupied by patients ought to be in the front of the building, the back being given up to the staff, servants, etc. Every room should have a balcony large enough to take a long chair and a table for the patient's use, separated by a glazed screen from neighbouring balconies, and supplied with the electric light. In this balcony, or in the grounds, the patient spends the greater part of his time. Airing galleries may also be provided if thought desirable. All doors should be double, and walls and floors must be well plugged. Of furniture there should be very little, and curtains and drapery likely to catch dust must be dispensed with. Linoleum, with felt underneath, is found to be the cleanest and most suitable floor covering. The window space should occupy three-quarters of the south wall, and sliding shutters should be provided to darken the rooms for light sleepers, and as a protection in stormy weather. The heating should, in the opinion of Professor Clifford Allbutt, be, if possible, by open fires, as it is wrong to heat air which is to be respired. If a radiator must be used, he urges that it should be set against an opening in the outer wall, and the air led over it into the room, so as to enter the latter at the bottom. If all passages and corridors be well and equally warmed, the chambers will need little heating. The sanatorium should not be on a very large scale, as in large blocks there are great difficulties in the way of ventilation. In Professor Allbutt's opinion, the most satisfactory plan for a sanatorium is a group of huts or villas, with a central administrative block. The grounds should be supplied with a number of open pavilions, and sheltered seats of various kinds.

Perhaps I can best give the reader an idea of a typical up-to-date sanatorium by summarising the description given by Mr. E. T. Hall of the sanatorium about to be erected at Frimley, Surrey, from his designs, by the Brompton Consumption Hospital.

It is intended for non-paying patients, of whom it is to accommodate about 100. The sanatorium proper, or patients' block, is two storeys in height, and consists of a central building, with two radial wings, or pavilions, all built of brick. Any one floor of the two sides, or of the four pavilions, may be appropriated to women, leaving the others to men, and each group is self-contained, with separate sanitary conveniences. The main entrance hall is in the centre, and behind it is a dayroom facing south, with two three-bed wards at the sides. East and west of the hall are the consulting and matron's rooms, dispensary, and nurses' duty-room. The first floor has similar patients' and nurses' accommodation, a residence for the matron, and a bedroom for the housekeeper. Overhead, in the roof, are bedrooms, etc., for the servants. The pavilions are connected with the centre by enclosed corridors having windows on both sides. Each wing contains twenty-two beds. Opposite every room door there is a window in the corridor, and, as all doors will have fanlights, carried, like the windows, to the ceiling, there will be thorough ventilation, and, even on hot, sultry days, the cooler air on the north side of the building will induce a current to the hotter south side. The windows will be casements, those on the ground floor opening to the floor, so that, if necessary, beds may be wheeled out. The casements are so constructed as to keep out rats and other vermin, although the windows remain wide open. On the first floor there will be outside jalousie shutters, which can be closed to exclude either rain or intense sun heat, the windows remaining open. On the ground floor, rolling canvas blinds, like those over shops, will effect the same purpose, and also act as shelters for beds or couches placed outside the windows. By this means the advantages of a verandah are obtained. Between each pair of pavilions is a "sanitary tower," detached except for a cross-ventilated lobby. These towers contain all the patients' "w.c.'s," baths, lavatories, etc., no urinals being provided in the main building. There are two main staircases, and a fire escape staircase at the outer end of each pavilion. The heating generally will be by hot water, and the lighting will be by electricity throughout. The floors will be of wood, covered with linoleum, and all walls and ceilings will be of plaster, with concave angles. To the north of the sanatorium proper, and reached by a glass-covered way, will be two patients' dining-rooms, and a general assembly hall. Behind will be the kitchen block, servants' hall, etc., and at the east end will be the nurses' home, and, to the west, the medical officers' residence. Nearer the main road will be the laundry, boiler-house, engine-house, ambulance, mortuary, and gate-house. There will also be two laboratories.

In the paper by Dr. Rufenacht Walters, from which extracts have already been made, there are some valuable observations on the question of ventilation in relation to the open-air treatment.

For open-air treatment, says Dr. Walters, ventilation should be by large openings on opposite sides of the room. People, he remarks, have a morbid fear of draughts if the door is opened as well as the window; and yet, in this country, for the greater part of the year ventilation will be insufficient for curative purposes without a large opening opposite to the open window. With a brisk wind blowing, sufficient fresh air may enter by one large inlet, but in still weather, when there is little difference between the inside and outside temperatures, purification is too slow to be satisfactory without a large outlet opposite the inlet. The idea that the discomfort of open-air treatment can be safely mitigated by warming the incoming air is, states Dr. Walters, entirely mistaken, as some of the ozone is thereby destroyed. Besides, the average patient, in bed or on a couch, does not feel discomfort if he is properly protected. At most, a hot-water bottle should be allowed.

The neighbourhood of the Surrey hills has been found to be particularly suitable for sanatoria, owing to its dry, sandy soil and its richness in plantations of pines and firs, and one of the most pleasing and desirable sites is occupied by Dr. Hurd Wood's Sanatorium at Whitmead Hill, 'about three miles from Farnham. This institution is situated in about eighteen acres of most picturesque grounds, abounding in heather and pine trees, and commanding a delightful series of views of Hind Head, Leith Hill, and other beautiful and interesting localities. The sanatorium itself contains all possible facilities for the open-air treatment, and is most tastefully and comfortably equipped. It possesses a large verandah and balcony, 65ft. long, and the grounds are provided with several handsome shelters, built on turntables, so that they can be readily made to face in any direction required. The lighting is entirely by electricity.

An excellent example of an English private sanatorium may be found in the institution at Crooksbury Hill, near Farnham, conducted by Dr. Rufenacht Walters, to whose interesting paper reference has been made above. This sanatorium is situated on an eminence about 400ft. above the sea level, and commands charming views of the Surrey hills. It stands in a plantation of pine trees extending over more than thirty acres, and the grounds provide several miles of picturesque and well sheltered walks. The main building is built of brick, covered with white rough cast, and is all on one floor. The bedrooms all face south, and open on to a covered terrace, and are backed by a corridor having windows opposite the various doors. The sanatorium, which contains accommodation for twenty patients, is lighted throughout by the electric light, and is conducted according to the latest and most approved principles.

As has been said, a number of new sanatoria are now projected, or are already in course of construction. Among these may be mentioned a sanatorium on the most modern lines which is about to be erected by Mr. Thomas Hughes Pearce, of Tamworth, at Lydney, in Gloucestershire. This institution is to be constructed on a picturesque estate of some thirty acres, known as Aylburton Lodge. The site, which is at an elevation of some 400ft. above the lovely valley of the Wye, is only about two miles from the widest part of the Severn, and the neighbouring scenery is of the most charming description. There are extensive larch woods in the close vicinity of the proposed sanatorium, but the country is sufficiently open to allow of free access to light and air. It is hoped that the sanatorium, which is intended to serve the Counties of Gloucester, Monmouth, Hereford and Worcester, will be open before the close of the present year.

Before closing this chapter, it is perhaps desirable to sound a note of warning as to the method of providing hot water for the bathroom. For this purpose a supply from the kitchen boiler is, although old-fashioned, by far the safest and most satisfactory. The various apparata for the immediate heating of bath water, such as the several kinds of geysers, and similar appliances, have disadvantages which go far to counterbalance any convenience arising from a rapid supply of hot water. They are very liable to get out of order, thus making the supply unreliable, and there is the graver objection that, unless considerable caution is observed, there is an appreciable risk of an accident occurring, either through the inhalation of poisonous gas fumes, or through an explosion. Unless there is an abundant supply of air to the bathroom, the danger of ill-effects being caused by the fumes is a very real one, and, on the whole, it may be said that the best course is to avoid the use of these apparata, except in cases where either no other supply of hot water is possible, or it is absolutely necessary that hot water should be instantly obtainable. When geysers, etc., are employed, it is essential that they should be placed under the control of persons having a competent knowledge of their mechanism.

CHAPTER XVI.

The Use of Drugs in the Treatment of Consumption.

THE question of the extent to which drugs can be used advantageously in the treatment of consumption is one on which very wide differences of opinion exist. As was remarked in a paper contributed to the Congress by Dr. W. R. Huggard, of Davos Platz, while some physicians consider drugs to be, for this purpose, either useless or harmful,others regard the use of some particular one as constituting the only satisfactory course of treatment. Such drugs as creosote, cinnamate of soda, arsenic, formaldehyd, etc., have each their devoted adherents, who consider their pet remedy almost a specific. I shall, in due course, bring to the attention of my readers various papers in which the claims of certain particular drugs were advocated, but it will probably be better, in the first instance, to deal with some remarks on the use of drugs in general, which were contained in papers contributed by Professor Clifford Allbutt and Dr. Huggard, to whom I have already referred.

Professor Clifford Allbutt disavowed any faith in courses of drugs, whether antidotal, tonic, or topical, except in laryngeal cases, which should be attacked locally from the first. He pointed out, however, that the admission that there is no drug endowed with specific virtue in cases of phthisis does not imply that no drugs are useful. He is of opinion that, during liberal feeding, gentle laxatives, and especially an occasional mild mercurial alterative, prove valuable. He also considers that a drop of an arsenical solution may advantageously be employed in settling an irritable stomach, and that a few drops of strychnine may be used to brace up a slack one.

The question was dealt with at much greater length in the paper contributed by Dr. Huggard, who has had great experience among patients undergoing the open-air treatment at Davos Platz. After pointing out that sufficient attention is not always paid to the great variety which exists in the individualities of consumptives, and laying stress on the fact that no drug is useful in all cases, Dr. Huggard went on to indicate the various directions in which drugs may favourably influence the course of the disease. These he summed up as follows:—

(1) By improving the general health; as, for example, arsenic, quinine, strychnine, lime, and phosphorus preparations.

(2) By increasing the local resistance of the affected tissues, as by the derivations of creosote, salicyl preparations and counter irritants.

(3) By modifying the quantity or character of the secretions, as by the balsams, the terebinthinates, the essential oils, morphine and apomorphine, and inhalations, especially of formaldehyd.

(4) By controlling symptoms that react prejudicially on the patient, such as digestive ailments, excessive coughing, scanty expectoration, and retention of secretions, and fever.

While, however, thus largely recognising the value of various drugs, Dr. Huggard insisted that their use must be considered altogether subordinate to the general hygienic management, good food and fresh air, with suitable rest and exercise.

In cases where the stomach or digestion is out of order, he considered that the use of drugs is inadvisable, as a rule, except for restoring the digestive organs to their normal state. This latter consideration Dr. Huggard regarded as of much importance.

‘ Nothing,” he said, “ goes right while the stomach is wrong.”

Next to the state of the digestion, Dr. Huggard regarded temperature as the most important guide to the treatment. High temperature can, in most cases, be reduced without the use of drugs; but the return to a normal level can often be hastened by the administration of small doses of phenacetin, in combination with quinine and salol, and sometimes arsenic. Recurrent febrile attacks, and the tendency to attacks of a sub-acute inflammatory nature may often, he said, be greatly diminished by the use of arsenic, strychnine, and salicyl preparations.

Another important guide in the use or avoidance of certain drugs is the existence of a tendency to pulmonary hæmorrhage. This tendency, in Dr. Huggard’s opinion, is increased by the use of creosote, or guaiacol, which should be avoided in such cases. On the other hand, the lime salts, the terebinthinates, and the balsams, and morphines in small doses, have a somewhat restraining influence. The treatment of excessive cough, with which is allied the removal of pulmonary and bronchial secretions, requires, in Dr. Huggard’s estimation, a considerable amount of judgment. The balsams, and the terebinthinates, and tar, generally diminish bronchial secretion, and make it less tenacious, and easier to get up. Minute doses of morphine diminish secretion, but tend to make it more tenacious. Small doses of apomorphine loosen the secretion, and do not make it much more abundant. The morphine derivatives, heroin and dionin, greatly diminish cough, and slightly lessen expectoration, while, unlike morphine, they do not make the secretion more tenacious. For these reasons, Dr. Huggard makes considerable use of them. But the most valuable of all agents for modifying the bronchial and pulmonary secretions, according to Dr. Huggard, is the vapour of formaldehyd. For three years he has used this drug extensively in the treatment of consumptives, with very satisfactory results. When steadily employed, it favourably modifies the character of the secretions and at the same time diminishes the amount and makes expectoration easier. Moreover, if its use is persisted in during several months, the tubercle bacilli, as a rule, become much less numerous, and, in some cases, have even disappeared. The best way to use formaldehyd is by means of a muzzle-inhaler, care being necessary to protect the eyes and nose from the irritating fumes.

Dr. Huggard summed up his line of treatment as being determined, in the first instance, by the condition of the digestive system, the general health, and the state of nutrition. If nutrition and digestion are good, and the general condition satisfactory, he refrains from using drugs unless some definite indication is found to be present.

Having thus summarised the conclusions as to the general use of drugs in consumption arrived at by Professor Clifford Allbutt and Dr. Huggard, I propose to briefly give the outlines of a few papers in which the use of certain drugs was particularly advocated.

PERSODINE (PERSULPHATE OF SODA).

In a paper contributed by Dr. J. Hobbs, of Bordeaux, an account was given of the results obtained by the use of this drug in cases where patients were suffering from anorexia, or inability to take food. Dr. Hobbs began by pointing out that ability to take nourishment is an important factor in the struggle against the bacillus, but that it frequently happens that tuberculous patients, in spite of the efforts they make, are quite unable to eat, with the result that emaciation proceeds apace. In such cases, there is now available a preparation of persulphate of soda, first prepared by MM. A. and L. Legniere, of Lyons, and known as persodine. Dr.

Hobbs proceeded to give details of its employment in six cases which he has had under observation. One was a case of doubtful pulmonary tuberculosis (stethoscopic indications, but no bacilli found in sputum) in a girl of twelve years old. Three others were cases of the first stage of pulmonary tuberculosis in children of five and eight, and an adult male of twenty-four. The fifth case was one of tuberculosis in the second stage in a man of forty-nine, who was also feverish. The sixth case was one of tuberculosis in the third stage, accompanied by great increase of temperature, in a man aged twenty-eight. The children were the worst sufferers, from inability to take food. All six patients were given persodine in a little water an hour before meals—a teaspoonful for the children and a tablespoonful for the adults. By the second day, the girl attacked by doubtful tuberculosis, and one of the children in the first stage of the disease, had recovered their appetites. By the fourth day the same result had been achieved in the case of all the other patients.

In fact, a real craving for nourishment was set up. All the patients gained in weight. That of the little girl suffering from doubtful tuberculosis increased by 4 kilogrammes in 20 days, and two of the adults also showed notable advances. Even the patient in the third stage of the disease derived some benefit; the hitherto progressive emaciation was arrested, and there was a small increase in weight. Although the adults had rather large doses, two tablespoons a day, none of them were attacked by diarrhœa. Dr. Hobbs' conclusion is that persulphate of soda stimulates nutrition, and that it is effectual in combating anorexia in tuberculous patients.

CACODYLATE OF GUAIACOL.

A paper contributed by Dr. F. Barbary, of Nice, drew attention to the results obtained in the treatment of tuberculosis by the employment of the above drug, which was first prepared, in 1899, by Dr. Barbary himself and Mons. Rebec. The action of this drug is twofold—

(a) On general nutrition, strengthening the organism by cacodylic acid;

(b) On the tuberculosis itself, modifying the soil, and bringing about an arthritic revolution by means of the guaiacol.

It is used in the form of injections, dissolved in an oily medium. Each flask of 10 grammes of sterilised oil contains 0.0354 of cacodylic acid, equivalent to 0.05 of cacodylate of sodium, and 0.05 of guaiocol. A flask of the solution is injected every two days, with an eight days' interval after a certain time. In fifty cases, Dr. Barbary states, the effects have been compared with those of the ordinary treatment, with the result that it has been found, when combined with hygienic measures, to yield rapid and lasting results in the first and second stages of the disease.

INTRATRACHEAL INJECTIONS OF IZAL.

Dr. Colin Campbell, of Saddleworth, Yorks, gave some details as to the value of injections into the trachea of large quantities of izal. He urged that glycerine should be used as the vehicle instead of olive oil, which he contended is apt to block the air passages. Dr. Campbell referred to a series of unpublished experiments by Professor Sheridan Delépine, which went to establish the action of izal in destroying bacteria in the sputum, and he stated that it is easily practicable to inject into the trachea at a single sitting sufficient izal to disinfect 20oz. of sputum.

UREA.

Dr. Arthur H. Buck, Assistant Surgeon to the Sussex County Hospital, contributed a paper dealing with the discovery by Dr. Harper, of Nottingham, of the value of urea in the treatment of tuberculosis. Dr. Buck commenced his paper by remarking that the scientific treatment of infectious diseases nowadays tends towards the manufacture, and injection into the human body, of anti-toxins, but that, though this system had been attended by success in the case of some acute fevers, it has not proved satisfactory to any great extent in regard to tuberculosis. These anti-toxins, he then went on to point out, are chemical substances, foreign to the nature of man, and he proceeded to urge that, as the majority of persons are exposed to infection by tuberculosis, and as only the minority develop it, the majority must possess in themselves some substance or condition which is actively hostile to tubercle. Could, therefore, he argued, a similar condition be established in those susceptible to the disease, the human race would be relieved from tuberculosis. Dr. Harper's discovery seems to indicate that this condition can be obtained to some extent by the use of urea. It was suggested to him by his observation of the immunity of gouty persons from tubercle, and it is noteworthy, in this connection, that urine has long been taken as a medicine by the natives of India in cases of lung disease. Dr. Buck admits that it is impossible to say, as yet, how the urea acts, or what becomes of it after absorption, but he states that the experiments which he has made indicate that a certain proportion of the nitrogen is eliminated from the urea and retained in the body. Dr. Buck gives details of several cases which he has treated with urea in doses of from 20 to 40 grs. Of these I may summarise two, which can be taken as typical of those referred to in his paper.

A man, aged thirty-six, had suffered from apparently incurable lupus for twelve years. A large ulcer covered the forehead, cheeks, and upper lip. The nasal bones, and part of the eyelids, had disappeared. The urea treatment was tried under unfavourable circumstances, as the patient's life and surroundings were bad. His diet consisted chiefly of potatoes, and he had other old tuberculous trouble. Nevertheless, after a fortnight's treatment, the ulcer looked healthy, and its edges were level with the surrounding parts, and in three months all traces of active disease had disappeared, and the ulcerated surface had completely healed, with the exception of two small places.

A woman, aged thirty, had suffered for fifteen years from large tuberculous glands in the neck. There had been two operations, the last followed by recurrence of the disease below the angle of the jaw. At the time urea treatment commenced, the glands looked as if they must break down. After urea had been given for six weeks, the glands had nearly disappeared. At the time the paper was prepared, this case was still under treatment.

It has to be noted that none of the patients referred to by Dr. Buck appear to have been suffering from pulmonary tuberculosis.

FORMIC ALDEHYDE.

The inhalation of the vapour of formic aldehyde, or formaldehyd, has already been referred to in the summary of Dr. Huggard's contribution, but it was much more fully dealt with in a paper by Dr. Chowry Muthu, of Inglewood Sanatorium. Dr. Muthu states that the result of a great amount of experimental work which has been carried out on the Continent and in America, as well as in this country, has been to show that formic aldehyde, which is obtained by the oxidation of methyl alcohol, is a powerful antiseptic and germicide. At the present time, he states, it is rapidly superseding the older antiseptics, such as carbolic acid, perchloride of mercury, and others, among its advantages being that it is non-poisonous and non-corrosive, that it can be used in the form of a vapour which mixes well with the air, that it has no action on clothes, household articles, etc., and that it can be easily and cleanly applied. Dr. Muthu has closely investigated its efficiency in the disinfection of rooms, and has arrived at very satisfactory conclusions. In the course of his experiments, he found that broth cultures of certain staphylococci, placed on linen strips, and exposed in a sealed room to the vapours of this disinfectant, showed no growth after six hours, also that a ½ to 1 per cent. solution killed a pure culture of bacteria, including the bacilli of anthrax and typhoid, within from thirty minutes to one hour. But its employment as a disinfectant is only one of the uses of formic aldehyde. Dr. Huggard, as will have been seen above, has found it of much value in modifying the pulmonary and bronchial secretions, while Dr. Muthu claims to have achieved results of a still more striking nature. After referring to experiments in the same direction by Dr Lardner Green, of Salisbury, Dr. William Murrell, of London, and Professor Cervello, of Palermo, Dr. Muthu proceeded to give the histories of fifteen cases which he has recently treated with formic aldehyde, in conjunction with the open-air cure. It should be premised that the drug was used in two forms—(1) as a gas, and (2) as a 40 per cent. solution, known as formalin. The gas was generated either by placing formalin tabloids on a metal tray over a methylated spirit lamp, or by using, in addition to the above, a boiler for generating steam, the latter mixing with the formaldehyd vapour and rendering it more diffusible and more penetrating in its action. This second system, termed the "moist method," is considered by Dr. Muthu to be the more efficacious. The vapour is administered in a room of which the doors and windows are wholly or partially closed. The lamp is then lighted, the boiler is filled with hot water, and the paraform tablets are put in. The patient sits in a lounge chair, or lies in bed, and inhales the gas for one, two, or three hours. At first the vapour causes irritation to the eyes and nostrils, but this soon passes off.

When the aqueous solution, known as formalin, is used instead of the gaseous form, it is either placed in an inhaler, which the patient holds in his mouth for from four to six hours in the course of the day, or it is employed in the form of a fine spray, or in a nebuliser, a 6 to 10 per cent. solution being mixed with glycerine. Both these methods are used by the patients in the course of the day.

In regard to the fifteen cases described by Dr. Muthu, it should be said that none of them had any special medicine, except an occasional pill or mixture to correct indigestion, but in all cases the treatment was combined with the ordinary features of the open-air cure. Of the fifteen patients, twelve men and three women, five (all men) were, states Dr. Muthu, completely cured. No clinical signs or bacilli were found when they left, and they have since been in good health, and able to follow their usual employment. Seven, of whom one was a woman, were almost cured—that is, a few dry crepitations and a few bacilli remained when they left, but they have since remained well and able to work. Of the remaining three, one, a woman, was slightly benefited, while the other two were very slightly affected by the treatment. It should be added that of the five patients who were cured, three had affection of one lung, one had a large cavity in the left apex, and the fifth showed marked signs of breaking down of both lungs. Of the seven who were nearly cured, two had cavities of one lung and consolidation of the other. The others had more or less affection of both lungs. Dr. Muthu urged that formic aldehyde should be given a fair trial in every sanatorium.

He briefly summarised the effects of formaldehyde in pulmonary tuberculosis as follows:—

(1) It soothes the laryngeal and bronchial mucous membrane.

(2) It renders the expectoration less tenacious, and in time diminishes it.

(3) It lessens the fever.

(4) It diminishes the number of tubercle bacilli, and in some cases entirely eradicates them.

SANITAS OIL.

The above preparation has been found to have good soothing and curative properties in the case of affections of the lungs and throat. It can be best administered in the form of vapour, and as the fumes are quite harmless and non-poisonous, while having great antiseptic and okidative power, the process is not open to the objections which are urged against some forms of inhalation.

CARBONATE OF IRON.

In cases where patients are anæmic, carbonate of iron, if employed in a nascent condition, can be used with good effect. The best way to ensure it being taken in a nascent state is to prescribe it in the form of a Bipalatinoid, which consists of a small cachet of soluble jujube. There is a partition of the same material separating the exsiccated sulphate of iron from the carbonate of soda, so that these two constituents do not mix until the Bipalatinoid is dissolved in the stomach, and fresh carbonate of iron is then immediately formed. This soluble jujube cachet differs from the gelatine capsules, in that the latter are very difficult to dissolve.

CHAPTER XVII.

The Value of Röntgen Rays in Diagnosing Phthisis.

IN the course of the Congress several papers were read on the use of the Röntgen, or X Rays, in the diagnosis of pulmonary tuberculosis. The subject is necessarily of a very technical nature, but I will endeavour to put briefly, in a form intelligible to the lay reader, some of the principal points comprised in the contributions to which I refer. It is a matter of common knowledge that the Röntgen Rays have proved to be of the greatest value in locating foreign substances which have penetrated into the body, and also in determining the character of fractures, etc., of the bone. But it is not, perhaps, so generally known, outside medical circles, that efforts, frequently attended by success, have for some time been made to employ them for the purpose of examining the softer organs of the body, such as the heart, lungs, etc.

The lungs in particular have received a large amount of attention from students of the possibilities of the use of the rays, especially with a view to ascertaining to what extent, if any, they can be of service in the detection of tuberculosis. At the present time it is so difficult to diagnose with certainty the existence of tuberculosis of the lungs in the earlier stages of the malady by ordinary clinical examination, that anything which facilitates and renders more reliable the detection of the disease, and enables medical men to obtain a more accurate knowledge of its progress, is naturally a matter of no small importance. Up to the present, of course, the question of the degree to which the rays are likely to prove of service cannot be very definitely answered, the subject being still largely in the experimental stage; but it is, at least, a matter for congratulation that the rays can, at any rate, throw some light, in both senses of the word, on the condition of the lungs, and that the contributors of the papers read at the Congress take a hopeful view of the future utility in this direction of Professor Röntgen's great discovery. The main characteristics and mode of application of the rays are so generally known that they need not now detain me, and I will pass on at once to their use in the diagnosis of pulmonary tuberculosis, as dealt with in the papers contributed by Dr. Hugh Walsham, Assistant Physician to the City of London Hospital for Diseases of the Chest; Dr. Bonnet Léon; and Dr. A. Beclère, of the Hospital of St. Antoine, Paris. Dr. Walsham, who has been studying the employment of the Röntgen Rays for this purpose for the past five years, sets himself in his paper to answer the following three questions: (1) Can the Röntgen Rays show tubercle in the lung? (2) If so, at what stage of their development? (3) Can the rays detect tubercle in the lung before the other means of diagnosis already at our disposal? In dealing with the first question, Dr. Walsham pointed out that the image thrown by healthy lungs on the fluorescent screen is quite transparent from apex to base, with the exception of a few ill-defined shadowy lines to the right of the shadow cast by the heart. He also drew attention to the fact that if the movements of the shadow of the diaphragm on the screen are observed, it will be found that the diaphragm does not become flatter with respiration. It plunges up and down, piston-wise, its curve remaining unaltered. If, however, one of the lungs is affected with tuberculosis, even if it is limited to the apex, the movement of the diaphragm on the screen is much less on the affected side than on the other. The transparency stated to exist in the shadows of healthy lungs is also much less apparent in the case of those which are tuberculous. Images of the latter are, in greater or less degree, obscured by flocculent shadow, due to caseation. Dr. Walsham drew from these and other facts the inference that the first question may fairly be answered in the affirmative. He then passed to the question of the detection of cavities in the lungs, and stated that it was now beyond doubt that these could be detected by means of the rays. They can, in fact, diagnose a much smaller cavity than can be discovered by means of the stethoscope. The smallest Dr. Walsham has discovered by the use of the rays was less in size than a small marble. The rays are also of much use in ascertaining the extent of a cavity, being more reliable in this respect than auscultation.

With regard to the second question, Dr. Walsham had to admit that he feared the very earliest stage in the development of tuberculosis could not be detected by the use of the rays, but he claims that the rays can indicate in shadow very small tuberculous foci, and that they can, therefore, detect very early signs of the disease. He supported this view by referring to the cases of several patients in whom pulmonary tuberculosis had been diagnosed by the rays before there were any clinical indications. The third question also could, to some extent at any rate, be answered in the affirmative. Dr. Walsham concluded his paper with the expression of the opinion that this means of detecting an early tuberculous shadow brings us a little nearer the possibility of internal tubercle being treated by chemical rays, just as lupus, i.e., external tubercle, is to-day being successfully treated.

In the paper contributed by Dr. Bonnet Léon, of Paris, who has made over 600 observations with the rays, a much more hopeful view is taken of the possibility of detecting the earliest stage of the disease, and even the existence of a predisposition to tuberculosis. Dr. Bonnet Léon bases his method of observation on the movements of the diaphragm on the screen. If any anomaly in the motion of the diaphragm and certain of the muscles, which cannot be otherwise accounted for, is remarked, it will almost always be found that some tuberculous trouble exists. Dr. Bonnet Léon illustrated his theory by references to a number of cases of apparently healthy persons, the movements of whose diaphragms were found to be abnormal when examined by the rays, and who subsequently exhibited evident signs of tuberculosis.

Dr. Bonnet Léon urged, in conclusion, that examinations by means of the rays of all persons likely to be predisposed to tuberculosis owing to their family history, the excessive use of alcohol, their environment, etc., should be made.

The paper read by Dr. Beclère dealt mainly with technical questions as to the best way of carrying out examinations with the rays. It contained many suggestions of value to doctors having occasion to make diagnoses by this means, but not of any general interest. Dr. Beclère's main points were that the observer should stay some minutes in the dark before commencing the examination, and that precautions should be taken to restrict at will the divergent rays which traverse the thorax, so as to confine the surface illuminated by the screen, thus increasing the sharpness of outline and the definition of details.

CHAPTER XVIII.

The Relation between Human and Bovine Tuberculosis.

IN three out of the four sections into which the Conference was divided a very large amount of attention was paid to the numerous important questions arising from the existence of tuberculosis among cattle; the external symptoms of the disease, the methods of diagnosing it in living animals when no such symptoms exist, the value of tuberculin, the degree to which our herds are affected by the disease, the extent to which milk and meat from tuberculous animals are dangerous to the human consumer, the most efficient means of inspection with a view to preventing the sale of tuberculous meat, the payment of compensation to innocent owners of affected animals, the necessity of further legislation—all these and many kindred subjects were fully and minutely considered. The reader will understand that the task of reducing the great mass of information thus brought together into a summary, which, while comparatively brief, shall be lucid and adequate, is not of the lightest. I must therefore ask the reader to excuse any occasional lack of coherence, such as can hardly be avoided in dealing with a subject having so many and various aspects. I hope, however, that by dealing with each main feature of the question under a separate heading, and by avoiding the repetitions which necessarily occurred in a series of papers independently prepared, I may be able to present my readers with a sufficiently clear and homogeneous *resumé* of this very important subject.

As public interest largely centres in the new and startling theory put forward by Professor Koch, to the effect that human and bovine tuberculosis are not inter-communicable, which, if generally accepted, would largely revolutionise existing methods of combating the spread of consumption, it will perhaps be better that I should deal with this theory in the first instance, setting forth, first, the arguments which the Professor advanced in its support, and, secondly, some of the objections which were raised by other members of the Conference. Perhaps I may begin by reminding my non-medical readers that it has been known for many years that various animals, the flesh of which is used for human food, notably cattle, pigs, and poultry, are very subject to tuberculosis, and that, generally speaking, the organs which in man are most frequently affected are also those which are most often found to be tuberculous among the lower animals. It has been known, too, since Professor Koch's discovery of the tubercle bacillus, that the microbe which is the cause of human tuberculosis is to all appearance identical with that which produces the disorder among cattle. As a result of these facts, and others which will be referred to hereafter, it has been held practically universally during recent years that bovine and human tuberculosis are in essentials one and the same disease, and that it may be communicated from cattle to man and *vice versâ*. This is the belief which Dr. Koch has now so unexpectedly declared to be unfounded, or at any rate open to very serious doubt.

His new theory was embodied in a paper read before a general meeting of the Conference under the chairmanship of Lord Lister on the second day of the Conference. Dr. Koch began that portion of his paper with which we are now concerned by stating that tuberculosis in poultry differs so much from human tuberculosis that it may be left out of account as a possible source of infection for man. He then proceeded to point out that he had always expressed himself with reserve regarding the identity of human and bovine tuberculosis, and stated that for a number of years he had repeatedly carried on investigations with a view to forming a definite opinion one way or the other. For a long time, however, he was only able to experiment on small animals, such as rabbits and guinea pigs, and so long as this was the case he failed to attain any clear result, though he found indications of difference between human tuberculosis and that prevalent among the lower animals. But when, two years ago, he was able to begin experimenting with cattle he soon arrived at what he termed "absolutely conclusive results." It is not necessary for me to go at length into the experiments which Dr. Koch set forth in his paper. It will suffice to say that he infected a number of young cattle which were free from tuberculosis with tubercle bacilli taken from cases of human tuberculosis. The infection was conveyed in various ways, injection, inhalation, the consumption of infected water and fodder, etc., in some cases tuberculous sputum being conveyed direct into the animal's body. The result was that none of the cattle (there were nineteen in all) developed any symptoms of disease, and on their being killed, six to eight months later, no traces of tuberculosis were discovered, with the exception of a few small centres of suppuration at the point of injection, which would equally have been found had dead instead of living bacilli been introduced. Dr. Koch then infected a number of cattle with tubercle bacilli from the lungs of a tuberculous animal. The result was the opposite of that obtained in the case of human tubercle bacilli. Every one of the infected cattle rapidly developed the severest tubercular disorders, and all died, or had to be destroyed, within three months. Experiments of the same character were performed upon some swine, with similar results, though it is to be noted that, upon being dissected after death, some of the pigs infected with human tubercle bacilli were found to have "little nodules in the lymphatic glands of the neck, and in one case a few grey nodules in the lungs." Similar negative results were also achieved in the case of asses, sheep and goats. These experiments, together with those made by certain other investigators to whom he referred, appear to Professor Koch so "unambiguous and absolutely conclusive," that he stated in his paper that he felt justified "in maintaining that human tuberculosis differs from bovine and cannot be transmitted to cattle." He, however, expressed the desire that the experiments should be repeated elsewhere in order that all doubts might be removed.

Having thus emphatically expressed his conviction that tuberculosis cannot be communicated by man to cattle, the Professor turned to the still more important question as to whether it can be transmitted from cattle to man. Here, as Professor Koch pointed out, it is far more difficult to arrive at any definite conclusion. The experiments which he performed on cattle and other animals cannot, of course, be carried out in the case of man. It is, therefore, impossible to obtain any direct proof of the communicability, or the reverse, of the disease from the lower animals to mankind. The Professor was accordingly obliged to fall back upon indirect evidence, and his statement of the considerations which have drawn him to the conclusion that the consumption of tubercular milk or meat is not an important factor in the infection of man with tuberculosis may be summarised as follows:—The milk and butter consumed in great cities very often contains large quantities of the living bacilli of bovine tuberculosis. If, then, these bacilli were able to infect human beings, many cases of tuberculosis caused by the consumption of tuberculous food could not but occur, especially among children; and, as Professor Koch admits, it is the general opinion of the medical profession that such cases do frequently happen. In fact, however, says the Professor, this is not so. It can only be assumed with certainty that a case of tuberculosis has been caused by food when it is found that the disease has first attacked the intestine, and cases of primary tuberculosis of the intestine, as it is called, are extremely rare.

Out of the many cases which he has examined after death, the Professor has only twice seen this form of the malady. At the Charité Hospital, in Berlin, not more than ten cases of primary tuberculosis of the intestine were found in five years. Out of 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital, no instance of tuberculosis of the intestine was discovered without simultaneous tuberculosis of the lungs and bronchial glands. The Professor cited other similar statistics, but those given above will sufficiently indicate the facts by which he has been influenced. The inference he drew was that, not only is primary tuberculosis of the intestine a comparatively rare disease, especially among children, but that it is far from certain that the cases that do occur are caused by infection from bovine tuberculosis. As a consequence of his discovery that cattle cannot be inoculated with the human form of the disease, it is now possible, he said, to discover whether the bacilli found in a deceased tuberculous person are human or bovine by inoculating them into cattle. If there is no result, it may be assumed that the tuberculosis was not of bovine origin. This test the Professor has been applying, as opportunity allowed, during some six months past, and although the number of cases he has been able to investigate has been too small to allow of a definite conclusion being arrived at, the results so far attained do not, he says, bear out the assumption that bovine tuberculosis occurs in man. The Professor concluded this part of his paper by the statement that while the question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, it can already be said that, if the susceptibility does exist in any degree, such infection of human beings is, nevertheless, a very rare occurrence, as rare, indeed, as infection by hereditary transmission. "I therefore do not deem it advisable," the Professor went on to say, "to take any measures against it."

Such is the proposition with which Professor Koch surprised the members of the Conference, the majority of whom had for years been acting on the assumption that the converse of this theory represented the truth. That it caused considerable agitation may easily be understood, since a large part of the work of the Conference was connected with the formulating and perfecting of preventive measures which were now declared to be based upon a fallacy, and therefore unnecessary. It may be said at once that the majority of the subsequent speakers, while acknowledging Dr. Koch's high authority, were of opinion that his contention was as yet very far from established, and that it would be most unwise to relax any precautionary measures on the strength of a proposition which even its propounder did not claim to have conclusively proved.

CHAPTER XIX.

The Relation between Human and Bovine Tuberculosis *(continued).*

THE general feeling of the Congress as to Professor Koch's paper was very well expressed by Lord Lister, who, speaking when the Professor resumed his seat, strongly urged that, even if it was held that Professor Koch had established his first contention, namely, that human tuberculosis is not communicable to cattle, it did not follow that bovine tuberculosis was not transmissible to man. In support of this argument he instanced a suggestive circumstance in connection with small-pox infection. Although it is now generally accepted that cow-pox and small-pox are variations of the same disease, it has been found that the injection of small-pox virus into a cow is without effect. If, however, the virus is injected into a monkey, the animal thus inoculated develops the disease, and if, then, virus from the diseased monkey is injected into a cow, the latter is attacked by cow-pox. This example of how the virus of an infectious disease might be modified in its passage through the animal or human system ought, Lord Lister considered, to make people hesitate before drawing a too sweeping conclusion from Professor Koch's failure to infect cattle with tuberculosis from human tubercle bacilli. Lord Lister also doubted whether the absence of primary tuberculosis of the intestine was necessarily an indication that the infection had not been introduced by means of food.

He mentioned other diseases due to alimentary infection, in the case of which the intestine was by no means always the first part of the system to be attacked.

Dr. Koch's theory was also vigorously combated in a paper read before a general meeting of the Conference by Professor John McFadyean, who pointed out that the identity of bovine and human tuberculosis had been generally supposed to have been finally determined by Professor Koch himself when he discovered that the centres of human and bovine tubercular disease contained bacilli that were identical in their characteristics. The labours of hundreds of investigators, he went on to say, during the succeeding eighteen years produced nothing in conflict with this conclusion. On the contrary, the discovery that tuberculin produced a reaction in tuberculous cattle, whether human or bovine bacilli had been used in its preparation, seemed to have finally established the identity of the disease.

Professor McFadyean admitted that there had been considerable divergency of opinion as to the frequency of the transmission of tuberculosis from animals to man and *vice versâ*, but the possibility and probability of such reciprocal infection had never, he said, been seriously disputed during the past eighteen years. The Professor then proceeded to combat seriatim the specific arguments propounded by Professor Koch against the theory of the inter-communicability of human and bovine tuberculosis. He agreed with Professor Koch that bovine tubercle bacilli are more virulent for cattle than human bacilli, and that the danger of cattle becoming infected from human beings is but small. He denied, however, that these facts prove, or even make it probable, that bovine bacilli have only a feeble power of producing the disease in man. If it had been found that bovine bacilli were dangerous only to cattle, this supposition might have been held to have some probability, but, on the contrary, it was admitted that they were highly dangerous for such diverse species as the rabbit, horse, dog, pig, sheep, and, in fact, practically every quadruped on which they had been tried. The Professor attached considerable importance to this circumstance, since, as he stated, it is known that all disease-exciting bacteria which are common to all domesticated animals are also dangerous to man. He thought it very far from proved that the difference between human and bovine bacilli in respect of virulence for cattle is of such a fixed and constant nature as to constitute an unmistakable distinction between the two. There are very great differences in the virulence of tubercle bacilli even among animals of the same species, and although a low degree of virulence for cattle might be considered a characteristic of human bacilli, he thought it could be readily proved that the disease is, at any rate, sometimes transmitted by man to the lower animals.

The Professor then turned his attention to Professor Koch's contention that only cases of primary intestinal tuberculosis can have had their origin in infected food, and that such cases are extremely rare. On this point, he was quite unable to accept the facts urged by Professor Koch in support of his opinion. English statistics, he said, in no way agree with those compiled in Germany. So far from the primary intestinal form of the disease being extremely rare, investigations carefully carried out in London and Edinburgh hospitals, extending over 547 cases of children suffering from tuberculosis, showed that from 28 to 29 per cent. of the cases were due to primary tuberculosis of the alimentary canal. In the face of these figures, he thought it must be held that, among children, at least, the form of the disease which Dr. Koch declared to be rare, was, on the contrary, comparatively common. Professor McFadyean, however, went on to say that he did not consider that infection by means of milk so frequently occurred among children as some authorities had supposed. Still, he regarded the danger as a very real one, and one against which stringent precautions ought to be taken. The Professor concluded his paper, other portions of which will be dealt with later on, by an amusing comment on Professor Koch's report of his experiments with the pigs. "We ought not," he said, "to concede to the milkmen the right to sell us tubercle bacilli even if we were assured that—like Dr. Koch's experimental pigs—we had nothing to fear beyond the development of 'little nodules here and there in the lymphatic glands' of our necks, and 'a few grey tubercles in our lungs.'"

Dr. Brouardel, the head of the Paris Faculty of Medicine, and a member of the Institute, who also read a paper before a general meeting of the Conference, did not directly refer to Professor Koch's new theory, possibly owing to his paper being prepared before the latter was publicly propounded, but he emphatically expressed his belief that tuberculosis could be set up in the intestines by the consumption of tuberculous food, and he declared that, although the danger of tuberculous meat and milk spreading the disease ought not to be exaggerated, it nevertheless existed, and should be guarded against.

I should only weary my readers if I attempted to give a *resumé* of all the criticisms of Dr. Koch's new theory which were elicited in the course of the Conference. Generally speaking, they followed the lines of thought suggested in the observations of Lord Lister and Professor McFadyean. It may be said, however, that various speakers referred to cases in which cowkeepers who had attended tuberculous animals had contracted the disease, and instances were also given, notably by Dr. Nocard, the distinguished French authority, of stables having been infected by the presence in them of tuberculous cowkeepers. I may also remark that Dr. James Niven, Medical Officer of Health for Manchester, drew attention to the fact, ascertained by *post-mortem* examinations, that while there is an almost complete absence of tuberculous lesions in new-born infants, the proportion of children suffering from tuberculosis steadily increases with their advance in age, and that primary abdominal tuberculosis is much more frequent in infants than in adults. These circumstances are obviously open to the inference that milk, the staple food of young children, is in some degree responsible for the conveyance of infection. A similar deduction may be made from some statistics prepared by Dr. Von Korosy, of Budapest. From these figures it appears that, out of 4,000 children who died from tuberculosis and were made the subjects of investigations, it was found that the number of those who had been artificially fed was three times greater than of those who had been fed at the breast. Dr. Von Korosy also recorded the significant circumstance that, whereas the frequency of consumption during five years out of 100,000 living people, was 722 for Roman Catholics and 625 for Protestants, it was only 376 among Jews, who, as is well known, take special precautions as to animal food intended for human consumption.

In concluding my remarks on this question, perhaps it may not be superfluous for me to repeat that the medical and veterinary members of the Conference, both English and foreign, were practically unanimously of opinion that it would be most premature and unwise to relax any of the precautions against the sale of tuberculous meat or milk on the strength of the facts as yet adduced by Professor Koch. Earl Spencer, at the final general meeting, vigorously advocated this view, and his remarks evidently met with the strong approval of his large and distinguished audience.

CHAPTER XX.

The Character and Causes of Bovine Tuberculosis.

IN dealing with the question of the intercommunicability of human and bovine tuberculosis before treating of the nature, cause, and diagnosis of the latter, I have, perhaps, as the saying is, rather put the cart before the horse. Professor Koch's new theory, however, so dominates this subject at the present time that I have thought it more convenient to deal with it in the first instance.

It may be as well to commence by pointing out that, even should it be established that tuberculous meat or milk is only a very rare cause of the infection being conveyed to man, the existence of tuberculosis among cattle would remain a matter of great and urgent importance, especially at a time when English stockbreeders are hard pressed by foreign competition. For, putting aside for the moment the question of danger to human life, the fact remains that the mortality and loss of quality among cattle, occasioned by bovine tuberculosis, entail an enormous financial loss to the cattle raisers of the country. The stamping out of the disease is, therefore, a matter of national import, the desirability of which is only partly affected by the existence of doubt as to the extent to which it is responsible for disease among mankind.

The serious proportions of the evil can best be made manifest by quotations of some of the figures concerning the prevalence of the malady which were submitted to the Conference. Mr. James King, Veterinary Inspector for the City of London, produced statistics showing that out of 500 cows which he examined after they had been slaughtered, 46.8 per cent. were tuberculous; out of 53 heifers, 11, or 20.75 per cent., were affected; and of 116 oxen, 15, or 11.45 per cent., were tuberculous.

Among calves the proportion of diseased animals was very low, no more than 1.27 per cent. Interesting figures were also supplied by Mr. J. S. Lloyd, Veterinary Inspector for Sheffield, and formerly Veterinary Surgeon to the Sanitary Committee of Manchester. Mr. Lloyd stated that, as the result of elaborate calculations, he has come to the conclusion that the number of cows with tuberculous udders in Great Britain is over 14,000. When it is borne in mind that the proportion of diseased udders among tuberculous cows is only 3 per cent., it will be seen that the above figure indicates a larger prevalence of bovine tuberculosis than may appear at first sight.

Many other statistics could be cited, but it will suffice to say that they all pointed to the fact that an extremely high proportion of the cattle of the country are affected with tuberculosis to a greater or lesser degree. Professor McFadyean, indeed, puts the proportion at not less than 30 per cent.

The character and symptoms of tuberculosis among cattle were treated of at length in a paper read by Professor Dewar, the Principal of the Royal Veterinary College, Edinburgh. The existence of tuberculosis is frequently first indicated, he pointed out, by a harsh sound in the throat during respiration and an occasional cough. Then a loss of condition ensues, the hair becomes dry, and often sweat is found over the shoulders in the mornings. Frequently also there is a peculiar facial expression which a skilled observer can readily detect. At a later stage the animal becomes what is called "hide bound," the skin losing its suppleness and becoming less movable. The cough then becomes more frequent and spasmodic, and emaciation gradually sets in. In cases where the udder is affected, the progress of the disease is often slow, and the udder may often be in such a condition as to render milk tuberculous for weeks before there are any external indications of the malady. Indeed, apart from the use of tuberculin, with which I shall presently deal, it is often extremely difficult to diagnose the existence of tuberculosis in cattle. Many of the symptoms mentioned above are found also in the case of other diseases, such as chronic bronchitis, verminous broncho-pneumonia, etc., so that it is often very difficult to say with certainty whether the animal is tubercular or not. It likewise very often happens that an animal is to some extent affected with tuberculosis without there being any external indications whatever.

I have already pointed out that, generally speaking, the organs which are most liable to tuberculosis in man are likewise those which are most frequently attacked in the case of animals. The outward appearance of the lesions occasioned in animals by the tubercle bacilli is, however, often very different from that of those which are found in man. This was clearly brought out in a paper by Dr. William Brown, who stated that persons inexperienced in the *post-mortem* examinations of tuberculous cattle were often surprised at the grape-like masses found in the intestines, the lichenous-looking patches on the liver, and the enormous tubercular solid growth, sometimes weighing many pounds, attached to the diaphragm, all of which characteristics form in appearance a striking contrast to human tubercular lesions. Dr. Brown did not, however, consider that this circumstance pointed to any essential difference between the bovine and human forms of the disease.

As in the case of man, tuberculosis among animals is caused by means of infection, although the element of heredity cannot be altogether ignored. Professor Bang, of Copenhagen, has observed more than 400 cases of tuberculosis in fœtuses, or newly-born calves, due to uterine infection from the mother, but he states that the proportion of congenital tuberculosis hardly amounts to more than 0.33 per cent. of the killed calves, even in the most infected regions. Contagion, therefore, is the real cause of the spread of the disease among animals. The various means by which this takes place were set out in a paper by Professor Duncan McEachran, of McGill University, Canada. The infection of healthy animals, he said, takes place readily from cohabitation, the bacilli gaining entrance by the respiratory organs in most cases, but by the digestive tract in many, especially in calves when suckled by diseased mothers. Calves, pigs, and other animals also contract the disease by feeding on milk or dairy products containing live bacilli. The chief source of infection, however, in Professor McEachran's opinion, lies in the buildings in which the animals are kept, and the frequent neglect of sanitation and disinfection. He instanced cases in which healthy animals, thoroughly tested by tuberculin, had been infected by being placed in sheds which had not been disinfected after habitation by tuberculous animals, and urged that too much trouble could not be taken to ensure that the buildings are free from germs and that sufficient air space is provided. It is also of importance that there should be a rational system of ventilation whereby pure air is admitted and foul air driven out, and that properly trapped drains should be provided to carry off the liquid excrements and prevent the return of noxious vapours.

Pure air and sunshine are likewise, as in the case of men, of the greatest importance. If the points above-mentioned were generally borne in mind and acted upon, and if stringent care were taken to weed out the tuberculous animals from herds, the prevalence of bovine tuberculosis might speedily be very greatly diminished, and in course of time reduced to insignificant proportions.

CHAPTER XXI.

Tuberculin as a Test for Bovine Tuberculosis.

THE value of tuberculin as a means of ascertaining the existence of tuberculosis in cattle naturally received attention in many of the papers read at the Conference, but for my present purpose I think it will suffice if I confine myself to the contributions of Dr. Malm, of Christiania, Professor McEachran, and Professor McFadyean. I have already referred to tuberculin in my introductory chapter, but to avoid misapprehension, I may here say that it is a sterilised glycerine extract of cultures of tubercle bacilli, first prepared by Dr. Koch in 1889, and that when injected into tuberculous animals it produces a rise of temperature, known as the "reaction." If there is no reaction, the presumption is that the animal is free from tuberculosis. Since, as I have shown above, there are frequently no external indications of the presence of the disease, tuberculin has proved of the greatest assistance in bringing to light cases the existence of which would not otherwise have been suspected. Naturally, tuberculin has not been altogether popular among farmers and cattle dealers, as it has caused many supposedly healthy animals—even prize beasts—to be condemned as tuberculous, and many objections have been raised against its use. It is a fact that, although generally reliable, it is not altogether an infallible test, some of its defects being thus summarised by Professor McFadyean, who is nevertheless convinced of its great value as a means of diagnosis: (1) An animal sometimes does not react for a considerable time after infection with the tuberculin; (2) In some advanced cases of tuberculosis no distinct reaction is obtainable; (3) In a considerable number of cases a second reaction is not obtainable for some days or weeks after the first. It will be noticed, however, that the result of these defects is in each case to facilitate the escape from discovery of a tuberculous animal. There does not seem any reason to suppose that it errs substantially in the direction of causing reactions in healthy animals. In this respect it is very largely reliable. An animal which reacts may fairly safely be considered tuberculous. Of course, opinion varies somewhat as to what extent of rise of temperature may be prudently regarded as a reaction indicating tuberculosis. Professor McEachran thinks that a rise of 2 degrees Fahrenheit above the highest normal temperature is ordinarily due to the presence of tubercle, but the single occurrence of such a rise during the day might sometimes be due to accidental causes. In a typical reaction the rise and fall of temperature is arch-like in its course, the maximum temperature occurring in the seventeenth hour after infection, and the normal being regained about the twenty-fourth hour. There are, however, various causes, such as copious draughts of water, atmospheric heat, etc., which may modify the reaction, and all these have to be taken carefully into account by the operator.

With regard to the objections to the use of tuberculin ordinarily raised by stockowners, Professor McEachran states that he sent a circular to the cattle inspectors throughout Canada, in which he asked for replies to the following questions:—

1. Do you know of any case in which the use of tuberculin has caused abortion?

2. Do you know of any instance in which a bull has been rendered impotent by the use of tuberculin?

3. Do you know of any case in which the general

health of the animals has been injured by the tuberculin?

4. How many cattle have you tested during the year?

5. How many post-mortem examinations have you witnessed of animals condemned in consequence of having reacted to the test?

6. In how many instances did you fail to find tubercle?

The first three questions were unanimously answered in the negative. The aggregate answer to the fourth was over 22,000, and to the fifth 579. The answer to the sixth was ten, and one doubtful case. Thus, out of nearly 600 post-mortems, in only eleven instances was the accuracy of the test placed in doubt.

The same questions were likewise sent to a number of farmers, and the replies were equally favourable to the tuberculin test.

The conclusion at which Professor McEachran has arrived is that tuberculin is reliable, and that it produces no evil results on the animals treated with it.

The leading points in Dr. Malm's paper are that the tuberculin should be of such strength as to kill tuberculous guinea pigs within eight hours, when given in doses of from 20 to 30 centigrammes, that a dose of not less than ½ to 1 gramme should be given, that when tuberculin produces fever in non-tuberculous animals, the fever is not typical and does not attain such a degree as in tuberculous cases, and that, to determine with certainty whether reaction exists or not, it is necessary to take the temperature from the sixth to the twentieth hour after injecting, not less frequently than every second hour. So great is Dr. Malm's belief in the accuracy of the test that he does not hesitate to declare that if nothing tuberculous is found on dissection after a typical reaction, it is the dissector who is at fault.

CHAPTER XXII.

Existing Regulations against the Sale of Tuberculous Milk.

A.—THE UNITED KINGDOM.

EVER since the discovery of the tubercle bacillus gave rise to the belief that tuberculosis could be communicated to man by the consumption of the meat or milk of animals suffering from the disease, attempts have been made, with varying degrees of energy and success, in nearly every civilised country to prevent the sale to the public of milk and meat capable of propagating the malady. It has been found, however, that the matter is one of great delicacy and difficulty. Owing to failure to realise the extent and urgency of the peril, it has been found in most countries extremely difficult to enlist a sufficient degree of public support to justify the adoption of really stringent and effective measures. It has likewise been necessary to take into consideration the views of the important sections of the population engaged in the occupations of stock-raising, dairy farming, and the sale of meat and milk, who very naturally look with suspicion on any legislation which appears likely to be prejudicial to their interests. Hardly less embarrassing than the two obstacles mentioned above has been the difficulty of deciding what measures will best attain the twofold object of protecting the public while not unduly handicapping the producers and middlemen. There has, unfortunately, all along been great difference of opinion among experts as to the degree of stringency which is called for in the public interest. At one time very extreme views prevailed in some quarters. The compulsory examination of all milk-producing cows, and the enforced destruction of those found to be tuberculous, with or without compensation, found numerous advocates, and was even put into practice in Belgium and Massachusetts. In both cases, however, it was found both impossible and impolitic to carry out such a drastic scheme, and nowadays more moderate counsels generally prevail. It is agreed by nearly all the leading authorities that milk from a tuberculous cow is only dangerous when the udder of the animal is affected, and this fact, together with the admitted impossibility, owing to the enormous prevalence of bovine tuberculosis, of attempting to compulsorily destroy or remove from use all cows suffering from the malady, has brought about a general inclination to advocate measures of a less drastic and more practicable character. There is also, in the case of this country, a widespread feeling that, in view of the depression existing among the farming and stock-breeding communities, it is very important that nothing should be done which would unnecessarily add to the difficulties under which they already labour. At the same time, it must be admitted that the steps taken up to the present in this country for the protection of the milk supply from tuberculous infection are very far from adequate, and that in this respect we are much behind various foreign countries. It is true that two Royal Commissions have exhaustively enquired into the question, but unfortunately their recommendations have, up to the present, very largely not been given effect to. The present position as regards legislation on this subject was clearly put before the Conference by Dr. Charles Porter, the County Medical Officer of Health for Shropshire, who, being also a barrister-at-law, is well qualified to deal with the legal aspects of the matter. Dr. Porter pointed out that the following are the existing provisions for improving the conditions of cowsheds and checking the distribution of milk from diseased animals:—

The Dairies, Cowsheds, and Milkshops Orders, 1885 and 1886.
The Contagious Diseases (Animals) Act, 1886.
The Infectious Diseases (Prevention) Act, 1890.
The Regulations Made under the above Orders.
Clauses in certain Local Acts.

The first-named Order provides for the registration and sanitary construction of dairies and cowsheds, and renders them liable to inspection. It also prohibits the use of milk from a diseased cow for feeding other animals, unless it has been boiled, but—and it is a very big "but"—tuberculosis is not one of the diseases to which it applies. This serious omission was to some extent remedied by an Order issued in 1899, which prohibited the mixing of tubercular milk with other milk and its sale for human consumption, but, whether by accident or otherwise, this Order failed to extend to tuberculosis the other provisions of the former Orders, so that, extraordinary as it may seem, a sanitary authority has no power to make regulations for the inspection of tubercular cattle in dairies, and no power to prohibit the feeding of animals on tuberculous milk.

The Contagious Diseases (Animals) Act, 1886, gives a sanitary authority's officers right of entry on premises for the purpose of enforcing the Orders of 1885 and 1886, but this Act, again, does not apply to tuberculosis, so that the officers of a sanitary authority, apart from certain special local Acts, to which reference will be made hereafter, have no right of entry into any cowshed in reference to cases of this disease.

Even, however, did all the provisions of the above Acts and Orders apply to tuberculosis, there would still be a serious drawback to their efficiency. They give a sanitary authority no power to inspect cows outside their own district, so that an enlightened district may be left at the mercy of an apathetic one, from which it draws part of its milk supply. This defect also has been remedied in certain local Acts.

Yet another defect in the existing legislation pointed out by Dr. Porter lies in the fact that County Councils have now absolutely no powers in reference to tuberculosis among animals. They have, in fact, no authority at all in regard to dairies and cowsheds, all such powers being vested by the Act of 1886 in the Urban and Rural Sanitary Authorities. As an instance of the consequences of this condition of affairs, Dr. Porter stated that the Shropshire County Council, when recently invited to take action in obtaining concerted veterinary inspection of milch cows, and in providing facilities for tuberculin testing, found itself powerless either to do or spend anything for this purpose.

The Infectious Diseases (Prevention) Act, 1890, empowers the Medical Officer of Health to inspect dairies in his district and the animals therein if there is evidence that disease has been occasioned by milk supplied by them; but in this case, once more, tuberculosis is not one of the diseases to which this provision applies.

In March, 1899, certain Regulations were issued under the Dairies and Cowsheds Orders. By these regulations, cowsheds were divided into two classes—those accommodating cows which are habitually grazed on grass land during the greater part of the year, and which, when not so grazed, are turned out during a portion of each day, and those sheltering cows which are practically continuously confined in them. In the case of the first class, or "country cowsheds," no recommendation whatever is made as to the amount of cubic space which should be allotted to each animal. In the case of the second class, i.e., "town dairies," it is suggested that 800 cubic feet of air is the proper allowance for each cow. Both Dr. Porter and Dr. Niven, of Manchester, regard the omission to make any reference to cubic air space in the case of "country cowsheds" as regrettable, inasmuch as these are, as a rule, from a sanitary point of view, much inferior to those found in towns. It has also to be borne in mind that in towns milch cows are generally young animals, and are usually slaughtered at the end of a year, whereas in the country they are kept for much longer periods, and thus have more time in which to develop the disease. In fact, statistics show that country cows are more frequently tuberculous than those kept in town. In Manchester and Liverpool the proportions of infected country and town milks are 13.4 to 5.2, a very striking and significant disparity. The Regulations also fail to deal with the practice of placing cows with ther nostrils close to the wall, although it is known that the air at the heads of such stalls is usually more polluted than elsewhere, and consequently a sufficiency of moving air is particularly required.

It will be evident from what has been said above that measures for the protection of the milk supply, as far as tuberculosis is concerned, are in a very elementary condition in this country. Provisions exist, whether always effectively carried out or not, for securing that cowsheds shall be constructed and maintained in a sanitary manner, and also for the prevention of the mixture of milk from tuberculous animals with milk intended for human consumption. But these measures, neither universally nor very thoroughly enforced, exhaust the precautions against the sale of tuberculous milk which the Legislature of the United Kingdom has seen fit to put into practice.

Although, however, the general law remains in this unsatisfactory condition, certain great towns, notably Manchester, Liverpool, and Glasgow, have succeeded in obtaining local Acts containing provisions of a much more effective nature. As an example of the kind of regulations which are in force in these towns, I will take the case of Manchester, which is fortunate enough to possess in Professor Delépine one of the greatest living authorities on bovine tuberculosis.

About two years ago the Corporation of Manchester, in common with certain other towns, obtained from Parliament a local Act containing clauses thus summarised by Dr. Niven, the Manchester Medical Officer:—

1. That a cow known to be suffering from tuberculosis of the udder must be isolated, and that the milk from such cow must not be used for human food.
2. Powers were given to inspect the cows, and to take samples of milk, also to take samples of mixed milk produced, or sold, or intended for sale within the city. These powers can be exercised outside the city on the production of an order of a justice having jurisdiction in the place in which the farm is situated.
3. If the Medical Officer of Health is of opinion that tuberculosis is likely to be caused to persons residing in his district by the milk supplied from any dairy, the dairyman may be summoned to appear before the Corporation to show cause why an order should not be made prohibiting him from supplying milk within the city.
4. A dairyman supplying milk within the city, who has in his dairy any cow affected with, or suspected of tuberculosis of the udder, shall forthwith give written notice to the Medical Officer of Health of the district which he supplies, stating his name and

address and the situation of the premises where the cow is. The penalty for omission to give notice is £2.

The fourth clause is, unfortunately, practically a dead letter, owing, in Dr. Niven's opinion, to the inadequacy of the fine which can be imposed. The way in which these regulations are carried out is as follows: Inside the city the cows are systematically examined, and if any suspicious condition of the udder is discovered, a sample of milk is drawn into a bottle specially sterilised in Professor Delépine's laboratory for the purpose, and forthwith sent to the Professor for examination. If the milk is found to be tuberculous, the cowkeeper is requested to have the cow slaughtered under veterinary inspection. In the case of farms outside the city, samples of mixed milk are taken from the cans as they arrive at the railway stations, or from milk carts, and submitted to Professor Delépine. Should he declare a sample tuberculous, an order is obtained from a justice of the district in which the farm is situated, empowering the Medical Officer and a veterinary surgeon to visit the farm, inspect the cows, and take samples of milk from suspected udders. If these samples are found by Professor Delépine to be tuberculous, the farmer is required to isolate the affected cow, and is advised by the Medical Officer of Health to have her forthwith slaughtered. Professor Delépine supplied for the information of the Conference a detailed account of the procedure he adopts in examining suspected samples of milk, but this is of too technical a character to be here reproduced. It will suffice to say that elaborate precautions are adopted to prevent the infection of the sample after being taken from the cow or milk can, and that each sample is examined both microscopically and by inoculation into guinea pigs. No sample is adjudged tuberculous unless the animals inoculated are found after death to show distinct traces of the disease. The process generally occupies about a month, but if the microscopic examination gives strong reasons for suspecting the milk, the cowkeeper is warned in the meantime that his animal is under suspicion. As to the results achieved by the enforcement of these clauses, it may be mentioned that while out of 108 samples taken at railway stations before they came into operation, twenty, or 18.5 per cent., were tuberculous; since the clauses came into force only forty-seven tuberculous samples have been found out of the milk from 401 farms, i.e., 11.7 per cent., a reduction of considerably over one-third.

Nevertheless, Dr. Niven is not altogether satisfied as to the progress attained. He thinks that to ensure really good results it should be provided by law that all cows found to be suffering from tuberculous udders should be slaughtered, that all restrictions on the inspections of herds supplying the city should be removed, and that a heavy penalty should be attached to failure to notify suspicious conditions of the udder. It must, of course, be borne in mind that all tuberculous milk excluded from Manchester and the other towns having similar powers is not necessarily altogether removed from the market. There is too much reason to fear that much of it is simply sent to other places where no such precautions exist.

In Liverpool, according to Dr. E. W. Hope, the measures adoped, which are similar to those in force in Manchester, have succeeded in rendering the milk supply emanating from the 6,000 cows kept within the city practically free from tubercle. The chief danger comes from the milk from country cows, owing to the difficulty and expense of maintaining supervision over farms outside the city, though in this respect also an improvement has recently been effected.

CHAPTER XXIII.

Existing Regulations against the Sale of Tuberculous Milk.

B.—OTHER COUNTRIES.

ABROAD, and in certain of our colonies, much more vigorous action has been taken. In Belgium and Massachusetts, as already stated, heroic measures in the shape of compulsory testing by tuberculin and slaughter of diseased animals were at one time adopted. In both cases very serious opposition was experienced, and the experiment was abandoned as impracticable. At present, in Belgium, animals can only be condemned to be slaughtered if the disease is diagnosed by means of external symptoms. But although these extreme measures have been abandoned, most civilised countries have provisions for checking the disease which appear stringent when compared with those in force in the United Kingdom. The conditions existing in these countries may be summarised as follows, many of the statements being condensed from particulars in the paper contributed by Professor McEachran:—

CANADA AND THE UNITED STATES.

In Canada, according to Professor Heath Sweetapple, of Ontario Veterinary College, bovine tuberculosis does not exist to anything like the extent which it has attained in the Eastern Hemisphere. Nevertheless, far more attention has been paid in the Dominion to the stamping out of the disease than in many European countries. As far back as thirty years ago, long before Koch's discovery of the tubercle bacillus, Professor McEachran read a paper before a medical society at Montreal, in which he referred to the relationship between human and bovine tuberculosis, and advocated measures for the supervision of dairies and inspection of milk. At that time these views met with no acceptance, but the Professor persevered in propagating his opinions, and in 1886 he succeeded in inducing the Canadian Government to amend the Animals Contagious Diseases Act, so as to include tuberculosis in the list of contagious diseases, a step which, as already pointed out, has not yet been taken in this country. Nowadays the Dominion Government shows considerable energy in combating the disease. Testing by tuberculin is done at its expense when voluntary application is made, but it is required as a condition that the whole herd shall be tested, and that reacting animals shall be quarantined for life. In this way, during 1900 nearly 18,000 head of dairy cattle were officially tested. There is no compulsion, but no compensation is given for animals which have to be quarantined. As regards the importation of beasts from abroad, for a number of years, in both Canada and the United States, all animals were tested in quarantine before being allowed to land. The cattle importers strongly objected to this practice, owing to the loss of freight money, etc., which they thus incurred, and a system was devised whereby a number of British veterinarians were authorised to test the animals before embarkation. This plan, however, according to Professor McEachran, proved a failure, as many animals certified in England to have passed the test were subsequently found to react when subjected to tuberculin. As a consequence of this unpleasant state of affairs, the Canadian and United States Governments have each appointed an expert of their own, who resides in the United Kingdom, and whose certificates alone are accepted. As between Canada and the United States, a sufficiently stringent series of regulations is in force. All cattle imported for breeding purposes into one country from the other have to be accompanied by a declaration by the importer that they are for breeding purposes only, a certificate by a Government veterinarian that they have satisfactorily passed the tuberculin test, and a certificate by a Government veterinarian that they are not suffering from any contagious disease other than tuberculosis, and that no such disease exists in the districts whence they come. If not accompanied by these certificates, the beasts are detained in quarantine and subjected to the tuberculin test. If they are found to be tuberculous they are returned to the country from which they were shipped, or slaughtered, without compensation. Similar but less stringent regulations are in force with regard to the importation of animals for feeding purposes and settlers' cattle.

In the United States there is a great variety of legislation on this subject, nearly every State having more or less distinct regulations of its own. It is unnecessary here to go in detail through the various systems in force as summarised in Professor McEachran's paper. It will suffice to say that in most of the States there is provision for tuberculin testing by Government officials when thought desirable, and in the case of imported animals, and that reacting animals are quarantined or slaughtered. In some States, notably Maine, New Jersey, and New York, compensation is paid for condemned animals under a sliding scale according to the class of beast concerned. In Vermont, if slaughtered animals are found to be tuberculous after *post-mortem,* the owner receives half the appraised value. In New York the owner only receives compensation if no tuberculosis is found. It may be added that in Montana legislation has just been passed under which all towns of over 5,000 population will have a Meat and Milk Inspector, and all animals supplying milk will have to have a tuberculin test certificate and be inspected every month. It will be seen that in the United States, as in Canada, much more has been done in the way of fighting bovine tuberculosis than is the case in this country. Nevertheless, it is considered that in many of the States further legislation is required. Where stringent regulations have been efficiently carried out, satisfactory results have generally ensued.

THE CONTINENT.

Thanks to the labours of the great Danish expert, Professor Bang, Denmark perhaps stands at the head of the European nations in this matter. Every year the Parliamentary budget contains an item of several hundred thousand francs to be expended in precautions against bovine tuberculosis and the infection of milk and meat. Out of this sum subventions are paid towards the cost of testing the animals and disinfecting herds among which infected beasts exist. Free testing is done on voluntary application. Animals showing external symptoms of the disease are killed. The others are divided into healthy and reacting animals. These are kept in separate buildings, or partitions are used to divide the byres of healthy animals from those of diseased ones. Reacting animals are allowed to be bred from on the condition that the calves are fed on milk from healthy beasts, or milk which has been sterilised. Owners are compensated for slaughtered animals.

The above system, which was devised by Professor Bang, has been attended by most successful results. Denmark is also fortunate in the fact that the Government are largely assisted in their work by voluntary efforts. In almost all the important towns, according to a paper by Dr. Holger Röordam, from which some of the above particulars have been taken, there exist private associations which watch over the hygienic conditions of the milk supply, the prices current for which they also regulate.

Germany has shown herself by no means too proud to follow the excellent example set by little Denmark. In fact, the Government gives monetary aid to cattle owners who adopt the Danish system. Tuberculin is given free, while in most of the German States creamery and dairy produce has to be sterilised. Whether the Germans will see fit to relax these precautions as a result of the latest theory of their distinguished countryman, Professor Koch, remains to be seen.

In France, theoretically, the regulations are fairly stringent, as it is provided that all animals with tuberculous udders shall be immediately slaughtered, and that reacting animals shall be slaughtered within a year. But in practice, as Professor Brouardel pointed out in his paper, the measures adopted are not very effective. The enforcement of the law is entrusted to the *Maires*, but they only know of the existence of tuberculous udders when reported by the owners of the cows, and it is found that the owners only report the cows when they have run dry, that is, when they are no longer dangerous to the public.

Belgium, as has already been said, at one time adopted a system of compulsory testing and slaughter. This has been abandoned, and now only animals with external symptoms are slaughtered.

In Switzerland, according to Professor McEachran, from whose paper many of the above statements have been taken, free testing is practised, and reacting animals are marked by cutting out a triangular portion of the ear. Animals with external symptoms are slaughtered.

CHAPTER XXIV.

Existing Regulations against the Sale of Tuberculous Meat.

THIS subject is so closely allied with that of the sale of tuberculous milk that a large amount of what I have written with reference to the latter applies to the former also. This, of course, is especially the case with reference to measures to ensure the sanitary condition of cattle sheds and the weeding out of tuberculous beasts. I may, therefore, now confine myself to regulations as to the slaughtering of animals and the treatment of tuberculous carcases. These points were dealt with by very many speakers, and gave rise to a good deal of lively discussion. They were given much attention in a paper by Mr. James King, the Veterinary Inspector of the City of London, and with this I shall largely deal, especially as the moderation and fairness of Mr. King's remarks were acknowledged by the cattle trade representatives who attended the Conference. Mr. King pointed out that the great difficulty in dealing with the question so as to protect the public without unfairness to the butcher and cattle breeder lies in the fact that in the majority of cases the existence of the disease cannot be detected by a veterinary inspector. It therefore frequently happens that butchers who have purchased animals to all appearance perfectly healthy, find that after slaughter the carcases are condemned as tuberculous. The result of this has been to drive many butchers to go to the dead meat market instead of buying live animals, thus greatly increasing the competition from foreign dead meat, which cattle dealers already have to face. Under these circumstances it is not surprising that both butchers and cattle dealers are of opinion that they are suffering under a considerable measure of injustice so long as they do not receive adequate compensation for carcases, or portions of carcases, which are destroyed.

Turning now to the public side of the question, it may be pointed out that the existing provisions of the general law with respect to the inspection of meat outside the County of London are contained in the Public Health Act, 1875, and the Acts incorporated with it. Sections 116 to 119 of this Act enable any Medical Officer of Health or Inspector of Nuisances to inspect and examine any meat exposed for sale or deposited in any place for the purpose of sale. If it appears to him unfit for human food he may take it away and have it dealt with by a justice.

It will be seen that while these Sections give powers for the inspection of meat, they by no means make it necessary for meat to be inspected. By far the greater part of the animals slaughtered for food in this country are killed in private slaughter-houses, and unless a person having the right to inspect should happen to have his attention attracted to the state of a carcase exposed for sale, there is nothing whatever to prevent diseased meat being sold to the public. As was well pointed out in a paper by Dr. Shirley Murphy, Medical Officer of Health for the County of London, under our present law the responsibility for determining whether the flesh of animals is fit or unfit for food is thrown upon the butcher, and not, as in some other countries, upon the sanitary authority and their representatives. The latter can secure the punishment of the butcher, if he is found offending, but they have no powers, other than punitive, for securing that only healthy meat shall be placed upon the market.

Even where public abattoirs exist under strict veterinary supervision, the existence at the same time of private slaughter-houses makes it impossible to really prevent the sale of diseased meat. Alike in London, Liverpool, and Manchester, it has been found by the inspectors at the public abattoirs that a very small proportion of the carcases are tuberculous—in the case of Manchester only .3 per cent.—the explanation being that only supposedly healthy cattle are sent by their owners, those suspected of disease being slaughtered elsewhere. In brief, it may fairly be said that in this country there is no systematic inspection of meat before sale.

Dr. Shirley Murphy, in his very interesting paper, strongly urged that the only remedy for this very unsatisfactory state of affairs is the supersession of private by public slaughter-houses. Such a measure would, as he admits, encounter the strong opposition of the butchering trade, the members of which have advanced various arguments against the establishment of public abattoirs. Among other points, they urge that the price of meat would be increased, that the meat killed in public abattoirs would be less well cared for than that of animals killed in private slaughter-houses, that English-grown cattle would tend to be excluded from the meat market, that the poor would be deprived of the offal which at present they largely consume, and that the establishment of public abattoirs would constitute a charge upon the public purse.

In reference to the first of these objections, Dr. Shirley Murphy remarks that it is not supported by the experience of other countries. In Germany, it had been estimated that the cost of administration has represented a sum of less than one-half a farthing per pound of meat. Indeed, Dr. Schwarz, Director of the town slaughter-house at Stolp, asserts that, not only has there been no rise in the price of meat, but that owing to the improvement in quality the public has obtained better value for their money.

As to the suggestion that meat would be less well cared for in public abattoirs, Dr. Shirley Murphy declares that the contrary is the case. "Compare for a moment," he writes, "the difference between the opportunity given for slaughter in a well-appointed slaughter-house, fitted with every convenience, and with cold chambers, to which the carcases are removed, with the opportunity which exists in the small out-buildings and sheds in the rear of private houses in an English town." Turning to the contention that English cattle would be largely excluded from the meat markets, Dr. Shirley Murphy urges that, so far as London is concerned, the result would be the opposite, for every meat vendor would be able to purchase his own meat alive, instead of depending upon middlemen, who may prefer to supply him with the meat of foreign animals.

With reference to the question of offal, Dr. Shirley Murphy states that there is no reason why this should be unobtainable by the poor, and that Continental experience does not support the butchers' contention.

In regard to the last and, perhaps, most serious objection, namely, that public abattoirs would constitute a serious charge on the public purse, Dr. Shirley Murphy recalls the fact that, when the second English Royal Commission on Tuberculosis was sitting, its Chairman, Sir Herbert Maxwell, and several other members reported, after personal investigation abroad, that all the public slaughter-houses in Germany were self-supporting. The financial side of the question has also been examined into by a Commission in Saxony. The report was to the effect that the establishment of a public slaughter-house is in no way prejudicial to the finances of a town, nor does it increase the taxes of the citizens, and that, on the contrary, the funds devoted to the building and management form a very good investment. In fact, the receipts, without burdening the trader with heavy fees, provide an interest of from 5 to 6 per cent., as well as a contribution to a sinking fund, by which the debt is extinguished in from 35 to 40 years. Having thus dealt with the objections usually urged against the substitution of public for private slaughter-houses, Dr. Shirley Murphy proceeded to refer to the measures which have been adopted on the Continent for the inspection of meat and the establishment of public abattoirs. These I may summarise as follows: In Belgium, a law passed in 1890 requires that all animals intended for human food must be examined, after slaughtering, by an expert, appointed either by the town or the governing authorities of the commune in which the slaughtering takes place. The communes may also require inspection of the animal before slaughter. The inspection of the carcase must take place, at the latest, twelve hours after the slaughtering in summer, and twenty hours after in winter. If the meat is healthy it is stamped by the expert, large animals in at least every quarter, and small ones in at least every half. If the whole or part of the animal is considered unfit for consumption, notice is given to the burgomaster, who decides what shall be done with the carcase. It is unlawful to sell meat which has not been slaughtered in accordance with these regulations. Meat brought into the commune from outside has to be examined and stamped.

In many parts of Germany there is regulated meat inspection. Animals intended for food must be examined before and after slaughter. Public slaughter-houses are very general, and in Prussia, according to Professor Ostentag, have " literally grown out of the earth" during the past 20 years. In 1897 there were no less than 321.

In Sweden and Norway, the law requires the provision of communal slaughter-houses, and meat inspection is required in the towns; but, as far as the erection of public slaughter-houses is concerned, it appears to have been very imperfectly put into force. In Denmark, in 1899, there were public slaughter-houses and meat inspection in seven towns. In Austria-Hungary and Italy, legislative action has been taken, but has not yet been fully carried into effect.

CHAPTER XXV.

The Use of Tuberculin in the Diagnosis and Treatment of Human Tuberculosis.

I HAVE already referred to Professor Koch's discovery of the preparation known as tuberculin in the year 1889, and also to its successful employment in ascertaining the existence of bovine tuberculosis. The question remains, how far is tuberculin of value in diagnosing and treating the disease among mankind? This is a question about which there are very great differences of opinion, and it may at once be said that, neither as a means of diagnosis, nor as a curative agent, has tuberculin been largely employed, as far as human tuberculosis is concerned. On the first announcement of its discovery, at a great Conference of medical men held at Berlin in the autumn of the above-mentioned year, tuberculin was received with great enthusiasm, and high hopes of its future usefulness were widely held. Indeed, beliefs were entertained of its efficacy which went far beyond anything which could have been properly inferred from the cautious statements of Professor Koch, who has on many occasions emphatically declared that satisfactory results from the use of tuberculin can only be expected in cases in which only small portions of the lungs are affected, and in which there is no evidence of excavation of lung tissue. In more advanced cases he has stated that amelioration of symptoms is the utmost that can be looked for. Unfortunately, the limitations of the new preparation, thus candidly admitted by Professor Koch, were overlooked in many quarters, with the result that when the use of tuberculin was repeatedly found to not result in effecting a cure, the proposed remedy quickly fell into disfavour.

But even more prejudicial to the reputation of tuberculin has been the suspicion that it is apt to be positively injurious, even to the extent of facilitating the extension of the disease which it is intended to cure. Less than a year after the announcement of Dr. Koch's discovery, another distinguished German savant, Professor Virchow, perhaps the most distinguished of living pathologists, announced that, on examining the corpses of patients who had been treated with tuberculin, he had found evidence which convinced him that the preparation caused destruction of the tissues around tubercular centres, and so enabled the bacillus to set to work on tissues which had previously been unaffected.

In some of these cases Virchow contended that if tuberculin had not been used the bacillus might have remained harmless, encased, as not infrequently occurs, in tissues which have become hardened and fibrous. These statements made a profound impression upon the medical profession, and as they found corroboration from numerous experts who had arrived at similar conclusions, tuberculin fell into very general discredit, except, of course, as a valuable agent for the diagnosis of tuberculosis among cattle and other animals.

The use of tuberculin, both as a diagnostic and as a curative influence in human cases of the disease, has, however, by no means been completely abandoned. A number of distinguished authorities, including Professor McCall Anderson, Dr. Heron, of the City of London Hospital for Diseases of the Chest, and Drs. Nansen, Osler, Goetsch, Petruscky, and Spengler, are of opinion that it may safely be used as a means of diagnosis in the case of man, and that it possesses valuable curative properties when used in suitable cases and with all proper precautions.

(1) TUBERCULIN AS A DIAGNOSTIC.

Taking first the value of tuberculin as a diagnostic, I may refer to papers contributed to the Conference by Professor McCall Anderson and Dr. G. A. Heron. Professor McCall Anderson's opinion, put in a nutshell, is that tuberculin is of enormous value as a means of diagnosis, and that it is an anomaly that, while so widely recognised as a very certain test for tuberculosis in cows, it is so rarely used by medical men in the case of human beings. Dr. Heron, who has made a very extensive use of tuberculin for both diagnostic and curative purposes at the City of London Hospital, has arrived at a very similar conclusion. Had tuberculin been of use for no other purpose than that of diagnosis it would, he tells us, "have deserved our best attention, our high appreciation." He is convinced that it is both safe and reliable. In his own experience of this use of tuberculin, extending over more than 2,000 injections, he has never known any evil consequences follow its administration. His conclusion, in short, is that it has no injurious effect in any condition of disease, whether tubercular or not.

As to its reliability as a test, he asserts that there can be no doubt that it produces its characteristic reaction whenever tuberculosis is present. So rare indeed is its failure to react when the disease is present, that cases in which failure is recorded may safely be neglected. In this connection I may refer to the interesting investigations made by Dr. Eric France, of the London County Asylum, Claybury, as recorded in Dr. Heron's paper. Dr. France, being desirous to ascertain who among his insane patients were tuberculous, tested fifty-five of the inmates of the asylum with tuberculin. In forty-five cases there were characteristic reactions. Thirty-four of these reacting patients have since died, and of these the bodies of twenty-nine were submitted to *post-mortem* examination. The result was that in every case active tubercle was found. Of the ten inmates who did not react, five have since died, and been examined *post-mortem.* In no instance was there any trace of tubercle. As a result of these experiments, Dr. France states that he is "satisfied not only with the accuracy of the diagnostic power of tuberculin, but also with its entire harmlessness, both in the tubercular and the non-tubercular."

It will be understood that I give the above only as individual expressions of opinion. Neither the reliability nor the safety of tuberculin as a diagnostic in cases of human tuberculosis must be supposed to be as yet held by the medical profession, as a whole, to be definitely established.

(2) TUBERCULIN AS A CURATIVE AGENT.

Several of the papers read before the Conference referred to the use of tuberculin as a means of curing or ameliorating consumption and other forms of tuberculosis, including lupus. Of these I propose to confine myself to the contributions of Professor McCall Anderson, Dr. Heron, and Dr. Baradat, of Cannes.

It should be premised that two kinds of tuberculin are now in use, "old tuberculin," i.e., Professor Koch's original preparation; and "new tuberculin," the latter a less powerful agent, which was devised with a view to removing some of the objections alleged against the former serum. Here, again, the subject has two aspects: (1) safety; (2) efficacy. As to both of these, Professor McCall Anderson takes a favourable view. He considers that tuberculin may be safely employed as a means of treatment if it is used in suitable cases, if the dose is not too large, or too rapidly increased, and if the intervals between successive injections are not too short. When thus properly employed, he is of opinion that it is likely to yield good results in the early stages of consumption, and that in cases of external tuberculosis it is almost invariably beneficial. In advanced cases of consumption, when a large extent of lung surface has become involved, he thinks it should be used with caution, if at all. He is also of opinion that if relapses are to be prevented, it must be borne in mind that, in addition to the employment of tuberculin, it is essential to make use of pure air, generous diet, and other measures recognised to be of value in combating the disease.

Dr. Heron suggests similar precautions in the use of the remedy, and expresses the opinion that the fact of its having largely fallen into discredit is mainly attributable to these not having been sufficiently attended to. He states that his hospital experience has afforded no corroboration of Virchow's contention that tuberculin helps to spread the disease to neighbouring healthy tissue. The first thirty-five patients treated by him with " old tuberculin " stayed in hospital, on an average, sixty-one days, a sufficient time, he thinks, in which to observe whether any clinical evidence could be obtained in support of Virchow's views. In no case was any such evidence found, although it was often searched for by other physicians besides those officially present in the wards. He mentions also that, in the case of a patient who was treated with tuberculin when known to be dying from extensive and advanced tuberculosis of both lungs, Dr. Perkins, then pathologist to the City of London Hospital, who performed the *post-mortem* examination. specially searched the viscera for traces of the formation of centres of probable fresh tubercular infection as a result of the administration of tuberculin, but found none.

Dr. Heron's paper contains some interesting figures bearing upon the curative qualities of tuberculin, but in considering these it must be borne in mind, as he points out, that it only rarely occurs in hospitals that there is a chance of treating really early cases of consumption. It is seldom, therefore, that tuberculin can be administrated by a hospital physician with reasonable expectation of a cure. Notwithstanding, however, this obvious difficulty, Dr. Heron's record of cases treated with tuberculin at the City of London Hospital shows distinctly encouraging results. Out of thirty-two patients, to whom tuberculin was administered, who left the hospital in 1891, it was ascertained, in 1898, that is, seven years afterwards, that ten were still well, one had remained well for six years, relapsing in 1897, and eight were dead. The remaining thirteen could not be traced. All these patients were treated with the "old tuberculin." Since 1897, Dr. Heron has used only "new tuberculin." In that year ten cases were so treated. Two died, one of them being the patient mentioned above, who was purposely inoculated when already dying. Of the remaining eight, all did well, and were able to leave the hospital and resume work. Three years later, it was found on inquiry that three were still well and supporting themselves by work; one remained well during the three years, and then had to return to hospital for a few weeks, because of a recurrence of the disease; two had died, both having been recognised as hopeless from the first. The other three had been lost sight of. It should be mentioned that of the ten patients just referred to, one was a case of lupus. In this instance a thorough cure was effected. Dr. Heron very rightly lays stress on the fact that a large proportion of the patients treated with tuberculin were able to return to work and to remain employed for considerable periods. This, as he urges, is a by no means unimportant result, even if a permanent cure is not effected.

Dr. Goetsch, of Slawentitz, has published, as mentioned in Dr. Heron's paper, an important communication on the results achieved by him by the treatment of patients partly with "old tuberculin" and partly with "new tuberculin." If the patient can bear the "old tuberculin," he conducts the whole treatment with it, commencing with extremely small doses. If the "old tuberculin" causes reaction he turns to the "new tuberculin," then, by carefully raising the doses, he prepares the way for a return to the use of the "old tuberculin." Dr. Goetsch has treated 224 cases in this manner, and he claims to have effected no less than 71 per cent. of cures. Dr. Heron considers that Dr. Goetsch's system may prove to be of great importance.

The opinion which Dr. Heron has arrived at as to the value of tuberculin, after a ten years' experience of it, both in hospital and among his private patients, may be best summed up as follows in his own words: "In cases of tuberculosis which fall within the limit laid down in 1890 by Koch, great benefit is sure to follow upon a proper use of tuberculin, and very often there is a complete disappearance of all symptoms of activity of the disease."

Dr. Baradat, of Cannes, in the course of an interesting paper, strongly champions the efficacy of anti-tuberculous serums and toxines in curing the disease, being of opinion that they are of great value in strengthening the resistance of the system to the bacilli by their action in stimulating the "phagocytes," or white corpuscles of the blood. He is opposed, however, to hypodermic injections, and advocates that the serum should be introduced by means of the mouth, a larger dose being given than when injection is practised. He claims that by this method the evil effects sometimes occasioned by the administration of serums in the old way are avoided, and refers to Drs. Boinet, Grasset, and Bertholon as having established the efficacy of this system of treatment. At Cannes, very successful results have been attained by the use of anti-tuberculous toxine, although Dr. Baradat admits that some of the credit must be allotted to the bright sun and pure sea air of the Mediterranean coast. It will be understood that Dr. Baradat's paper, while referring to serums apparently prepared on somewhat similar lines, does not specially refer to Koch's tuberculin.

Another allied method of treatment which may conveniently be dealt with here is the system devised by Messrs. Richet and Kericourt, and described to the Conference by Drs. A. Josias and J. C. Roux, of Paris, under which raw meat, and what the writers term "serum musculaire," are the remedies adopted. The treatment consists in daily giving each child—the paper before the Conference dealt solely with tuberculous children—the juice extracted by pressure from 500 grammes of raw meat, and by substituting raw for cooked meat in their dietary, the idea apparently being that natural anti-toxines are introduced by the meat juices. Drs. Josias and Roux give particulars of the cases of sixteen children whom they have thus treated in Paris hospitals. Four of these had only been under treatment for a few weeks when the paper was prepared, so they are left out of account. Of the remaining twelve, only one child was in quite the first stage of pulmonary tuberculosis. In this case the child's weight increased from 23 kilogrammes to 34 kilogrammes in seven months, and a cure was effected. Four children were in the second stage of pulmonary tuberculosis. In two of them, after four months' treatment, all signs of development of the disease disappeared, and they are considered to have been cured; in the third case the lesions in the lungs have remained stationary; in the fourth, an amelioration of the symptoms took place, but the patient was removed from the hospital too early. The remaining seven children were in the third stage of the disease, there being already cavities in the lungs. Six were likewise in a bad state of general health, and all these died within one to three months after the commencement of the treatment. The seventh, a little girl, who, despite advanced lesions and a cavity in the left lung, was in good general health, showed evident signs of amelioration at the end of the tenth month. The conclusion arrived at by Drs. Josias and Roux is that in the early stages of the disease the treatment arrests the development of the tuberculosis, but that in advanced cases there is no therapeutic result.

CHAPTER XXVI.

The Lessons of the Congress.

HAVING now placed before the reader a summary of some of the more important papers read before the Congress, it may perhaps be well for me, in conclusion, to set forth what, in my view, are the practical lessons which should be drawn from the proceedings of this important body.

I may say, in the first instance, that there could be no greater mistake than to suppose that the discussions at the Congress are not likely to have any practical outcome, and that its work has been of merely academic importance. It is too early yet to foretell to what extent the proceedings at the Congress will influence the efforts of sanitary authorities and others to check the dissemination of consumption, but it is already certain that in this direction it will have great and far-reaching results. A number of sanitary authorities have already decided to put into force certain of the measures which received the approval of the Congress, and many others are likely to do so in the very near future. It is, in fact, no exaggeration to say that the *laisser faire* attitude which has unfortunately been generally adopted in this country hitherto with regard to the prevention of consumption is now widely falling into disrepute, and the next few years are likely to see an organised and systematic attempt to combat the disease on a scale sufficiently widespread and extensive to justify the hope that real and substantial progress will be achieved.

What, then, are the directions which these efforts should take? What are the measures which seem to afford the greatest prospect of success, while at the same time being capable of adoption without too greatly disturbing the social customs and institutions of the country, or entailing a too heavy burden of expenditure on the already harassed ratepayer?

To deal with these questions in the shortest way, I will first set out in tabular form the practical steps which it seems to me are suggested by the deliberations of the Congress, and will then make such comments as seem to me to be necessary. The measures which appear to me to be desirable are, then, as follows:—

(1) Provision of Sanatoria and Isolation Homes for incurable cases out of the rates.

(2) The establishment of Municipal Anti-Tubercular Dispensaries.

(3) The establishment of a system of voluntary notification of cases of consumption which are accompanied by tuberculous expectoration.

(4) Periodical disinfection by the Sanitary Authority of houses known to be occupied by consumptives with tuberculous sputa.

(5) Legislation compelling all railway and tramway, etc., companies, and the proprietors of theatres and other places of public resort, and of factories and workshops, to take steps to prevent persons indulging in the practice of spitting on their premises, unless into properly constructed spittoons, to be disinfected at frequent and regular intervals.

(6) The distribution by sanitary authorities of circulars setting forth the various ways in which consumption is disseminated and the precautions which should be adopted to prevent the spread of infection.

(7) The adoption of measures for the gratuitous examination of sputum.

(8) The establishment of public slaughter-houses by local authorities.

(9) The adoption by friendly and insurance societies

of a system of sanatorium treatment for consumptive members, on somewhat similar lines to those followed in Germany.

(10) The improvement of the sanitary condition of working class dwellings.

(11) The adoption of higher standards of lighting and ventilation for enforcement in factories and workshops.

(12) The provision of adequate open spaces in all centres of population.

With regard to the first recommendation, the provision of sanatoria out of the rates, I may point out that one of the resolutions passed by the Congress was to the effect that the provision of sanatoria is an indispensable part of the measures necessary for the diminution of tuberculosis. How, then, can the establishment of these institutions in sufficient numbers and on a sufficiently large scale to afford treatment for an appreciable proportion of the necessitous consumptives of the country be secured? It must, I think, be admitted that the task is too great a one to be undertaken by voluntary effort, and, if this be the case, there remain only two alternatives—the provision of sanatoria out of the revenues of the State, or at the expense of the County, Municipal, or other local authorities. The first of these alternatives must, I fear, be at once considered to be out of the question. The burdens of the State are already so heavy that any Government would naturally hesitate to add to the Budget such a formidable item as the expenditure requisite to secure an efficient system of sanatoria. We are therefore forced to the conclusion that, if sanatoria are to be established on any adequate scale, it must be done out of the rates, and under the control of the various local authorities. It is not for me to attempt to detail a scheme for dealing with this matter, but I may, perhaps, suggest that in each county, including the County of London, a Sanatorium

Board, composed of delegates from the various local authorities, should be formed, and that this Board should be entrusted with the duty of formulating and carrying out a scheme of sanatorium treatment suited to the requirements of the county, the funds being provided by contributions from the local authorities proportionate to their population and rateable value. The sanatoria, of course, would not necessarily be situated in the counties to which they belonged.

With regard to the second suggestion, the establishment by local authorities of Anti-Tubercular Dispensaries, I have already so fully described the nature and objects of these institutions that it is hardly necessary for me to add anything further on this subject. I may say, however, that as these dispensaries are essentially local in character, and their utility largely depends upon their managers being in close touch with the population which they serve, it would probably be better for them to be worked direct by the Municipalities or Urban District Councils, and not through a Central Board such as I have suggested in the case of sanatoria.

Coming now to the question of voluntary notification, I may remark that it is not without some hesitation that I have included this in the list of desirable measures. Consumptives and their relatives naturally dislike the idea of the sufferer being publicly branded, so to speak, as a victim of the disease, and it is possible that the fear of notification might, in some cases, prevent a medical man being called in. On the other hand, it must be remembered that the Congress, after having before it a large amount of evidence as to the working of voluntary notification, strongly pronounced in favour of it, and there can be no doubt that it is almost indispensable if local authorities are to take up the task of disinfection and of providing sanatorium treatment. It is practically the only way in which the information requisite for these purposes can be obtained. If, however, voluntary notification is almost a necessity, it is none the less a system which requires to be worked with a considerable amount of care and discretion. It is essential that every precaution should be taken to prevent the names of notified persons becoming known, and also that persons should not be notified without their consent, or that of those in charge of them, having first been obtained.

The questions of the disinfection by sanitary authorities of houses occupied by consumptives, the establishment of public slaughter-houses, and the adoption of higher standards of lighting and ventilation have already been dealt with at some length, and need not now further detain me.

In reference to the bacteriological examination of sputum, this is a matter which could very well be dealt with by the Anti-Tubercular Dispensaries, and in cases where the latter do not exist the sanitary authority might arrange for the sputa to be examined in the laboratory attached to one of the sanatoria belonging to the county, or by one of the scientific institutions which undertake work of this sort.

The only one of the suggestions left on which I think a word is necessary is that as to steps for the prevention of spitting. I have not proposed the adoption of the drastic measures in force in New York, where it is an offence punishable by fine and imprisonment, because I think it doubtful whether public opinion in this country is, as yet, quite ripe for such a step. But I can see no reason why measures similar to those described in the chapter on the "Danger of Tuberculous Sputum" as being adopted in America with reference to the posting of notices against spitting, and the provision of spittoons by employers of labour and proprietors of places of public resort, should not be given a trial in this country.

In conclusion, I hope, as a medical man, that I shall not be thought to be pursuing any selfish purpose if I venture to urge that in all cases where the services of professional men are required, whether on the staff of an Anti-Tubercular Dispensary, or in bacteriologically examining sputum, or in any other way, they will be given a reasonable amount of remuneration. Of late years, the practice of getting medical men to perform professional work of a public character gratuitously has reached very serious proportions. All doctors in the ordinary course of things have to attend a considerable proportion of non-paying patients, and in the case of the necessitous, their services are gladly and cheerfully given. But it is asking too much of them to expect them to also devote a considerable part of their time to duties of a public and philanthropic character, such as attendance at an Anti-Tubercular Dispensary, without any recompense. There is really no reason whatever why they should be called upon to do so, as no other class of professional men are made victims of in this way. The fact is that many persons have almost come to think that because a person happens to be a doctor it is quite improper for him to expect to be paid for his services. I therefore trust that those local authorities which engage in the warfare against consumption will remember that the labourer is worthy of his hire, and will not make small economies at the expense of the members of a much tried and not over-remunerated profession.

THE END.

PRINTED BY THE CENTURY PRINTING CO., LTD., 19 & 20, FETTER LANE,
FLEET STREET, LONDON, E.C.

INDEX.

PAGE
Abattoirs, Establishment of Public 163-167, 178
Abbott, Experiments on Influence of Alcohol, by 41-42
Air, Influence on Tubercle Bacillus of Fresh 17, 18, 70, 79, 87-95
,, Treatment in Open.................... 106-111
Alcohol, Effect of Excessive Use of 38-44
,, Influence of, on Tissues 38, 41-42
,, Use in Moderation of 84-85
Alcoholism, Relation of, to Consumption 38-44
,, Thought Antagonistic to Consumption 38-39
,, Indirect Effect of 38
,, Direct Effect of, on Tissues 41-42
Alderson, Dr., Remarks by 66
Allbutt, Prof. Clifford, Estimate of Prevalence of Tuberculosis, by 46
,, ,, ,, Opinion on Influence of Climate held by 78
,, ,, ,, Paper on Diet, by 82-85
,, ,, ,, Paper on Use of Drugs, by 114-117
,, ,, ,, Views on Ventilation, by 108
Allchin, Dr., Opinion of, on Influence of Alcohol ...41
Apomorphine, Use of 116
Arsenic, Use of 115

Bacilli, Nature of 16
Bacillus, Discovery of Anthrax 16
(See also Tubercle Bacillus.)

PAGE
Bacteria, Discovery of 15
,, Leewenhoek's, Drawings of 15
,, Müller's Study of 15
,, Classification of, by Ehrenberg 15
,, Investigations of, by Cohn 15
,, Pasteur's Discoveries concerning 15
,, Fermentation and Putrefaction caused by 15
,, Grouping of, by Nageli 15
,, Connection of with Human and Animal Life 16
,, Three Great Groups of 16
,, Infectious Maladies caused by 16
Barbary, Dr. F., Paper on Use of Cacodylate of Guaiacol, by 118-119
Bardswell, Dr. Noel, Paper on the Responsibility of the Medical Profession, by 51-55
Beclére, Dr. A., Paper on Use of Röntgen Rays, by 128
Bell, Dr., Opinion of, on Influence of Alcohol 39
Bennet, Dr., Opinion of, on Use of Alcohol 84
Baudran, Dr., Statistics on Influence of Alcoholism, Compiled by 43
Bernheim, Dr. S., Paper on Diet, by 82
Bielefeldt, Privy Councillor, Paper on German Workmen's Insurance, by 105
Biggs, Dr., Work of, in New York 47
,, ,, Enquiry into Infectivity of Dust, by...68
,, ,, Enquiry into Infection of Adjoining Houses, by 72
Bordeaux, Action of Local Authorities of 33
Bovine Diseases, Connection of Bacteria with 16
(See also Tuberculosis.)
Brighton, Adoption of Voluntary Notification in ...66
Brouardel, Prof., Paper Read by 29
,, ,, Opinion on Infection from Sputum of 30-31

Brouardel, Prof., Opinion on Influence of Alcoholism of 42-44
,, ,, Estimate of Prevalence of Tuberculosis, by 46-47
,, ,, Opinion on Curability of Phthisis of....................50-51
,, ,, Opinion on Bovine and Human Tuberculosis of 138
Buck, Dr. A. U., Paper on Use of Urea, by ...119-121

Campbell, Dr. C., Paper on Intratracheal Injections of Izal, by 119
Calmette, Dr. A., Paper on Anti-Tubercular Dispensaries, by 46, 96, 99-100
Capo, Dr. Espina Y., Use of Sanitary Paper for Sputum, Recommended by 36-37
Casumen, Nutritive Value of 85
Carswell, Dr., Opinion on Curability of Phthisis of...50
Charteris, Dr., Prescription of Whisky, by 39
Children, Mortality from Tuberculosis among 49
Climate, Influence of 18, 78-80
Coates, Dr. Harold, Inquiry into Sources of Infection, by 64-66
,, ,, ,, Inquiry into Infectivity of Dust, by 68-72
,, ,, ,, Paper on Disinfection, by 74-76
Cohn, Investigations concerning Bacteria, by 15
,, Experiments, by 16
Consumption, National Association for Prevention of 32, 73-74
,, Prevalence of, throughout World 45-46
,, ,, ,, in France 46
,, ,, ,, in Germany 46
,, ,, ,, in England 47
,, ,, ,, in United States 47
,, Importance of Early Treatment of 50-56

PAGE
Consumption, Curability of 50-51
,, Failure to make early Diagnosis of 52-54
,, Notification of 57-66
,, Insurance in Germany against 101-105
Cornet, Dr., Enquiry into Infectivity of Dust, by 59, 68
Cotton, Dr. R. Payne, Opinion of, on Alcoholism and Consumption 39
Creosote, Use of 116

Davos Platz, Progress of Patients at 79
Deléarde, Prof., Experiments on Influence of Alcohol, by 41-42
Delépine, Prof., Enquiry into Sources of Infection by 64-66
,, ,, Experiments with Infected Dust, by 69
Denison, Dr. C., Paper on Devitalised Air, by......95
Diet, Importance of Good 81-85
Dionin, Use of 116
Disinfection of Infected Houses by Sanitary Authority 59, 63, 73-76
,, Inefficiency of Gaseous 74
,, Use of Chloride of Lime for 74
,, Use of Dough for 76
,, Use of Sanitas for 76
Dispensaries, Anti-Tubercular 33, 56, 96-100, 178-180
Dough, Disinfection by use of 76
Drugs, the Use of 114-124
Dust, Infectivity of Tuberculous 59, 68-72

Ehrenberg, Classification of Bacteria, by 15
England, Treatment of Consumptives in 9-10
,, Prevalence of Consumption in 47
,, Diminution of Mortality in 47-49

England, Best Districts for Sanatoria in 80
,, Erection of Sanatoria in 107
Esmarch, System of Disinfection Recommended by 76

Factories, Influence of Hygienic Condition of 65
.. Injurious Effect of Dark 88-89
,, Ventilation of 93-95
Females, Mortality from Tuberculosis Among 49
Fermentation caused by Bacteria 15
Filamenta, Nature of 16
Fischer, Investigation into Infectivity of Dried Sputum by 59
Food, Value of Abundance of 18, 81-85
Formaldehyd, Use of 116-117, 121-124
Formalin, Use of 122
France, Precautions against Spitting adopted in 32-33
,, Prevalence of Tuberculosis in 46

Gabrilowitch, Dr., Report on Progress of Patients, by 79
,, ,, Views on Dieting of 84
Germ Theory of Disease 16
Germany, Action of Friendly and Insurance Societies of 33, 101-105
,, Precautions against Spitting in 33
,, Prevalence of Tuberculosis in 46
., Diminution of Mortality in 46-47
,, Establishment of Sanatoria in 107
Geysers, Dangers of 113
Gordon, Dr. W., Paper on Wet Winds and Phthisis, by 80
Guaiacol, Use of 116
,, Use of Cacodylate of 118-119
Guillot, Existence of Healed Tuberculous Lesions shown by 50

PAGE
Guinea-Pigs, Inoculation of 69-72, 75-76

Hall, Mr. E. T., Paper on Construction of Sanatoria, by 89-92, 108
Harris, Dr., Prescription of Whisky, by 39
Hayward, Dr. T. E., Paper on Influence of Tuberculosis on Life Tables, by 48
Heroin, Use of 116
Heredity, Belief in, as Main Cause of the Disease 14, 15
,, Influence of 17, 20-28
Hillier, Dr. A., Paper read by 32, 34-35
Hippocrates, Opinion on Curability of Phthisis of 56
Hobbs, Dr. J., Paper on Persodine, by 117-118
Holland, Sanatorium Treatment in 80
Holmboe, Dr. M., Paper on Compulsory Notification in Norway, by 57-58
Houses, Disinfection of Infected 59, 63
,, Infectivity of Dust in Infected 68-72
,, Infection of Adjoining 72
,, Injurious Effect of Dark 88-89
,, Ventilation of 90-92, 94-95
,, Danger of Back-to-Back........................91
Hospitals, Provision of Isolation 64, 103-104
Huggard, Dr. W. R., Paper on Use of Drugs, by 114-117
Huss, Dr., Opinion of, on Alcoholism and Consumption 39

Infection, Modes of Conveying 64-66
,, Conveyance of, to Adjoining Houses ...72
Insurance, German Workmen's 101-105
Iron, Use of Carbonate of 124
Izal, Intratracheal Injections of 119
,, Use of, for Disinfection 77

Jong, Dr. R. de J. de, Paper on Sanatoria, by 80

Kelynack, Dr. T. N., Paper on Alcoholism and Consumption, by 38-42
King, Dr. H. Maxon, Paper read by 26-28
Knoff, Dr. G. A., Paper read by 22-25
Koch, Prof. R., Discovery of Anthrax Bacillus, by...16
  ,, ,, Discovery of Tubercle Bacillus, by..16
  ,, ,, Discovery of Tuberculin, by ...18-19
  ,, ,, Opinion on Heredity of 21-22
  ,, ,, Theory as to Non-Intercommunicability of Human and Bovine Tuberculosis ...19, 129-139
  ,, ,, Opinion on Infection from Sputum 29
  ,, ,, Statistics on Diminution of Mortality, given by 46-47
  ,, ,, Opinion on Notification, held by ...57
Korosy, Paper read by Dr. J. von 28
Kuttner, Dr. A., Paper read by 23

Laennec, Discovery of Stethoscope by 14
  ,, Tubercle Theory propounded by 14
  ,, Existence of Healed Tuberculous Lesions, shown by 50
Léon, Dr. Bonnet, Estimate of Prevalence of Tuberculosis, by 46
  ,, ,, ,, Paper on Anti-Tubercular Dispensaries, by 96-99
  ,, ,, ,, Paper on Use of Röntgen Rays, by 128
Leewenhoek, Drawings of Bacteria, by 15
Letulle, Existence of Healed Tuberculous Lesions, shown by 50
Light, Importance of Good 70, 87-95
Lille, Anti-Tubercular Dispensary at 33, 56, 96, 99-100
  ,, Mortality from Tuberculosis at 46
Lime, Disinfection by Chloride of 74-76
  ,, Use of 113

PAGE
Lime-juice, Use of 86
Lister. Lord, Opinion as to Human and Bovine Tuberculosis of 135-136
Liverpool, Adoption of Voluntary Notification in...66
London, Deaths from Tuberculosis in 47
,, Air Supply of 94-95
Lydney, Sanatorium to be Erected at 112
Lyon, Dr. T. Glover, Paper on Air Supply of London, by 94-95

Mackenzie, Dr. Hector, Opinion of, on Influence of Alcoholism 41
McDougall, Alderman, Paper on Voluntary Notification, by 58-66
MacFadyean, Prof. J., Paper on Bovine Tuberculosis, by 136-138
Males, Mortality from Tuberculosis among 49
Malibran, Dr., Paper on Diet, by........................82
Manchester, Voluntary Notification at 58-66
Meat, Infection from Tuberculous 17, 129-139
,, Regulations against Sale of Tuberculous 162-167
Microbes, Length of Knowledge of 15
Micrococci, Nature of 16
Montmartre, Anti-Tubercular Dispensary at 96
Morgue, Results of Autopsies at the 51
Morphines, Use of 116
Müller, Particulars of Bacteria given by 15
Muthu, Dr. Chowry, Paper on Formaldehyd, by 121-123
Milk, Infection from Tuberculous ...17, 65, 129-139
,, Danger of Excessive Use of 83
,, Regulations against Sale of Tuberculous 148-161
Mosny, Paper read by Dr. E. 22-24

Nageli, Order of Schizomycetes established by 15
Nantes, Anti-Tubercular Dispensary at 96

New York, Regulations against Spitting in 34
,, Diminution of Mortality in 47
,, Sanitary Organisation of 47
,, Compulsory Notification in 57
Niven, Dr., Inquiry into Infectivity of Dust, by ...67
Norway, Compulsory Notification in 57-58
Notification, Compulsory 57-58
,, Voluntary 58-66

Occupation, Influence of 22

Papillon, Paper read by Dr. G. E. 23
Parents, Danger of Living with Consumptive ...22-23
,, Inheritance of Enfeebled Constitution from Tuberculosis 24-25
,, Possible Protective Influence inherited from Tuberculosis 26-28
,, Influence of Age of 28
Pasteur, Discoveries concerning Bacteria, by 15
Pearce, Thomas Hughes, Erection of Sanatorium by 112
Persodine, Use of 117
Phenacetin, Use of 116
Phthisis, Meaning of Word 13
,, Knowledge of, in Ancient Days 13
,, Contagious Nature of 14
,, Caused by Bacillus 16
,, Late Discovery of 35
(See also " Consumption " and " Tuberculosis.")
Poore, Dr., Opinion of, on Influence of Alcohol ...41
Preece, Sir W., Forced Air Draughts suggested by 94
Pregnancy, Influence of the Disease during 23-24, 26
Prevention, Best Modes of 17
Putrefaction caused by Bacteria 15

Quinine, Use of 115

Rays, Use of Röntgen 125-128

Robertson, Dr., Paper on Lighting, by 87-89
Röntgen, Use of Rays discovered by 125-128
Ryn, Dr. Van, Estimate of Prevalence of Tuberculosis, by 45-46

Salicyl, Use of Preparations of 116
Salol, Use of 116
Sanatoria, Percentage of Cures at 51
,, Efficiency of Treatment in English 80
,, Best Districts in England for 80
,, Disadvantages of 97
,, Provision by German Insurance Societies of 101-105
,, Open Air Treatment at 106-111
,, Municipal Establishment of 178-179
Sanatorium, Gorbersdorf 51
,, Banchory 51-54
,, Gorbio 83
,, Frimley 109
,, Inglewood 121
,, Crooksbury 112
,, Whitmead Hill 111
,, Lydney 112
Sanichief, Use of 37
Sanitas, Use of 77, 124
Schill, Investigations into Infectivity of Dried Sputum, by 59
Schizomycetes, Order of, established by Nageli......15
,, Discovery of Pathogenous 16
Schrötter, Prof., Spittoon recommended by 36
Sheffield, Adoption of Voluntary Notification in ...66
Somatose, Nutritive Value of 85
Spitting, Legislation against, in United States ...31
,, ,, ,, in Australia 31
,, Precautions against, in England 32, 33, 35, 178
,, ,, ,, ,, France 32-33
,, ,, ,, ,, Germany 33

PAGE

Spittoons, Provision of 34
  ,, Dettweiler 35
  ,, Paper 36-37
Sputum, Danger of Tuberculous 17, 29-37
  ,, Disposal of Tuberculous 35, 36, 37
  ,, Use of Sanitary Paper for receiving ...36-37
  ,, Bacteriological Examination of 54-56
  ,, Infectivity of Dried 59, 68
Squire, Paper read by Dr. J. E. 22
Stethoscope, Discovery of 14
Strychnine, Use of 115
Sunshine, Influence on Tubercle Bacillus of 17-18
Surroundings, Influence of 22

Tatham, Dr. J., Statistics on Influence of Alcohol, compiled by 43
  ,, ,, ,, Statistics of Phthisis Mortality, by 48-49
Terebinthinates, Use of 116
Thompson, Dr. St. Clair, Estimate of Prevalence of Tuberculosis, by 47
Thorne, Dr. Bezly, Estimate of Prevalence of Tuberculosis, by 46-47
Tubercle Bacillus, Discovery of, by Koch 16
  ,, ,, Influence of Sunshine on 17
  ,, ,, not Generally Introduced before Birth 21-22
  ,, ,, Transmission of, by Kissing ...23
  ,, ,, Transmission of, by Infected Clothing 23
  ,, ,, Vitality of, in Sputum ...29-30, 55
Tubercles, Laennec's Theory of 14
  ,, Nature of 14
  ,, Origin of 15
  ,, Caused by Bacillus 16
  ,, Effect of Alcohol on 38-42
Tuberculin, Discovery of, by Koch 18-19

Tuberculin, Value of, as a Curative Agent 19, 171-176
,, Use of, for Diagnosing Human Tuberculosis 19, 168-171
,, Use of, for Diagnosing Bovine Tuberculosis 19, 145-147
Tuberculose, L'œuvre de la 32
,, La Ligue Francaise contre la 32
Tuberculosis, Proportion of, among Alcoholics ...42-44
,, Prevalence of 45-49
,, Diminution in Mortality from ...46-49
,, Influence on Life Tables of 48
,, Relation of Bovine to Human ...129-139
,, Character and Causes of Bovine..140-144
Treatment, Revolution in Modes of 17-18
,, Main Points of Present System of 18
,, Danger of Old Methods of 20-21
,, Importance of Early 50-56

Urea, Use of 119-121
Uterus, Infection from 22

Ventilation, Importance of Good 87-95
,, Use of Sheringham Valve for............93
,, Use of Fans for 94
Vinrace, Dr. J. H., Preface by ....VIII.
Visitors, System of Health 62-64

Walsham, Dr. H., Paper on Use of Röntgen Rays, by 126-127
Walters, Dr. F. Rufenacht, Paper on Ventilation, by 91-92, 110-111
Weber, Dr. Hermann, Opinion on Use of Alcohol of 39
Winds, Influence of Wet 80
Woodhead, Prof. Sims, Experiments on Influence of Alcohol, by 41-42

MALTINE WITH COD LIVER OIL

THE difficulty of exhibiting Cod Liver Oil is solved in

"MALTINE WITH COD LIVER OIL"

by molecular incorporation of a sufficient quantity—30 per cent.—of the best Cod Liver Oil in the best malt extract, "MALTINE." This combination is not only readily tolerated by the fastidious, but gives the best results as regards increasing weight and improving appetite and general nutrition. The oil is rendered easily digestible, and its therapeutic effect is reinforced by the association with a complementary, highly assimilable nutrient.

MALTINE WITH HYPOPHOSPHITES.

By its conversion of farinaceous foods into Maltose and Dextrine, and its stimulation of general digestion, "MALTINE" promotes the assimilation of the Hypophosphites, and is itself a valuable Bone-forming Agent, as it contains the natural phosphates of the best malt. *Each fluid ounce contains Hypophosphite Lime, 3 grains; Hypophosphite Soda, 3 grains; Hypophosphite Iron, 2 grains.*

Samples sent free of Charge to Physicians.

The Maltine Manufacturing Co. Ld.
24 & 25, Hart St. Bloomsbury, London, W.C.

In prescribing, kindly specify "MALTINE COMPANY."

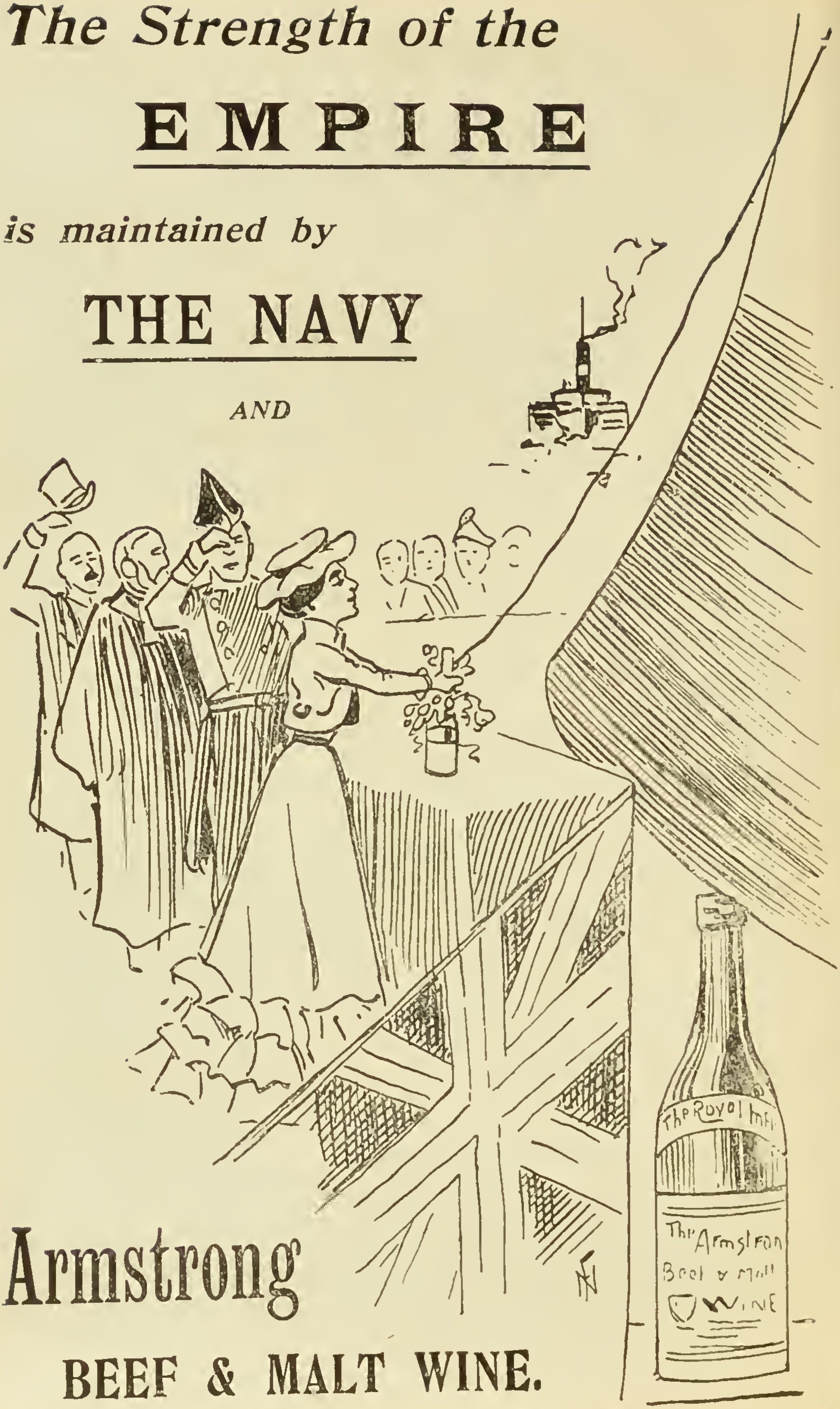
The Strength of the

EMPIRE

is maintained by

THE NAVY

AND



Armstrong

BEEF & MALT WINE.

PROPRIETORS: JAS. MURRAY & SONS, LIMITED, GLASGOW.

PRESCRIBED BY EMINENT LUNG SPECIALISTS.

USED IN CONSUMPTION HOSPITALS.

Readers of this book will notice that all authorities agree in stating that in treating Consumption the first aim should be to keep the digestive organs in a thoroughly healthy condition, so that the patient may properly assimilate nourishing food. That is just what ANGIER'S EMULSION does, and is one of the chief reasons why its use is so largely advocated by the leading Lung Specialists. It has been demonstrated beyond doubt that with ordinary nourishing diet and moderate doses of ANGIER'S EMULSION a rapid improvement of assimilation, nutrition, and weight takes place. Diarrhœa is checked and the bowels regulated. Sweating is relieved by the action of the hypophosphites, and the whole body is fortified and its disease resistance reinforced. Moreover, ANGIER'S EMULSION has a marked soothing and healing influence upon the mucous membranes of the lungs and air passages. The cough is relieved, expectoration facilitated, and strength is maintained, leading to cure in many cases and to positive relief in all.

ANGIER'S EMULSION

(Petroleum with Hypophosphites.)

Of all Chemists and Drug Stores, 1/1½, 2/9, and 4/6, post free.

THE ANGIER CHEMICAL COMPANY, LTD.,
32, SNOW HILL LONDON, E.C

A Sample Bottle Post Free if you mention this Book.

THE POPULAR
SCOTCH
IS
"BLACK & WHITE"

JAMES BUCHANAN & CO.
SCOTCH WHISKY DISTILLERS.
By Appointment to
H. M. THE KING.

BLACK SWAN DISTILLERY—26, HOLBORN, LONDON, E.C.; also

GLASGOW—14 and 16, Bothwell Street.
LIVERPOOL—Albany Chambers, Oldhall Street.
MANCHESTER—24, Barton Arcade, Deansgate.
BIRMINGHAM—17, Temple Street.
BRISTOL—Edinburgh Chambers, 16, Baldwin Street.
PARIS—217, Rue St. Honore.
MADRAS—Mount Road.

THE . . .

Treatment of Consumption

AND

Tubercular Affections.

Physicians are invited to apply for Samples of any of these Preparations in which they may be interested.

. . A few Preparations issued by . .

PARKE, DAVIS & CO., 111, QUEEN VICTORIA ST.,
LONDON, E.C.

Cod Liver Oil.
Egg Emulsion of Cod Liver Oil.
Creosoted Emulsion (containing 25% of Oil) with Hypophosphites.
Cod Liver Oil Emulsion with Hypophosphites (50% of Oil).
Antitubercle Serum.
Nuclein, and Nuclein Compounds.
Hematic Hypophosphites.
Guaiacol.
Taka-Diastase.
Creosote.
Rennin.
Pancreatin.
Syr. Hypophosphites Comp.
Iron Phosphate.
Kola, Coca, and Celery.
Cinchona Calisaya.
Anodyne Pine Expectorant.
Nutrient Suppositories.
Mosquera Beef Preparations.
Hæminal.
Solution Iron Peptonate and Manganese.
Chlor-Anodyne.

Parke, Davis & Co.,

111, Queen Victoria Street,
LONDON, E.C.

TELEGRAPHIC ADDRESS: "CASCARA, LONDON."

SOUTHALL'S

"SANICHIEF."

(TRADE MARK.)

FOR THE RECEPTION OF SPUTUM.

THE SANICHIEF consists of a small square of strongly but pleasantly antiseptic gauze and cotton wool tissue. It may be used for a considerable time before becoming saturated, and may afterwards be burnt.

By the use of Sanichiefs, danger of infection from tubercle is reduced to a minimum. They are specially recommended for home use, where the danger of infection from the presence of a consumptive member of the family is always very great.

In Packets of 20 at 6d. and 40 at 1/-

FROM ALL CHEMISTS, OR FROM THE MANUFACTURERS,

SOUTHALL BROS. & BARCLAY, LTD.,

LOWER PRIORY, BIRMINGHAM.

VALE OF CLWYD SANATORIUM.

THIS SANATORIUM is established for the treatment of Phthisis as carried out by Dr. Otto Walther, of Nordrach. It is situated at a height of 450 feet above the sea, on the sheltered aspect of mountains rising to over 1,800 feet. The climate is mild and dry, owing to the small rainfall (25 ins.), and to the porous nature of the soil (red sandstone). The Physicians are fully conversant with Dr. Walther's treatment, having themselves been patients at Nordrach. For particulars apply to—

GEORGE A. CRACE-CALVERT, M.B., M.R.C.S., L.R.C.P.; or
CECIL E. FISH, B.A., M.B., B.C., M.R.C.S., L.R.C.P.;
Llanbedr Hall, Ruthin, N. Wales.

"OPEN-AIR" CURE FOR CONSUMPTION.

"Belle Vue" Private Sanatorium,
Shotley Bridge, co. Durham.

Under the direct and sole management of a resident Specialist of experience. Beautifully situated. Results excellent. Both sexes received. Early application should be made to the Secretary for Prospectus and all particulars.

Telegrams: "DIVER, SHOTLEY BRIDGE." P.O. Telephone: No. 6, SHOTLEY BRIDGE.

CROOKSBURY SANATORIUM

FOR THE OPEN-AIR TREATMENT OF CONSUMPTION.

Specially designed, built, and equipped on carefully chosen ground, $1\frac{3}{4}$ hours from London. Sheltered from East, North, and West, on a sunny southern slope, over 400 feet above sea level. Large grounds covered with pine woods and heather, with beautiful distant views. Two Resident Physicians. Three Trained Nurses. New block lately opened. For particulars, apply to

Dr. F. RUFENACHT WALTERS, CROOKSBURY RIDGES, FARNHAM, SURREY.

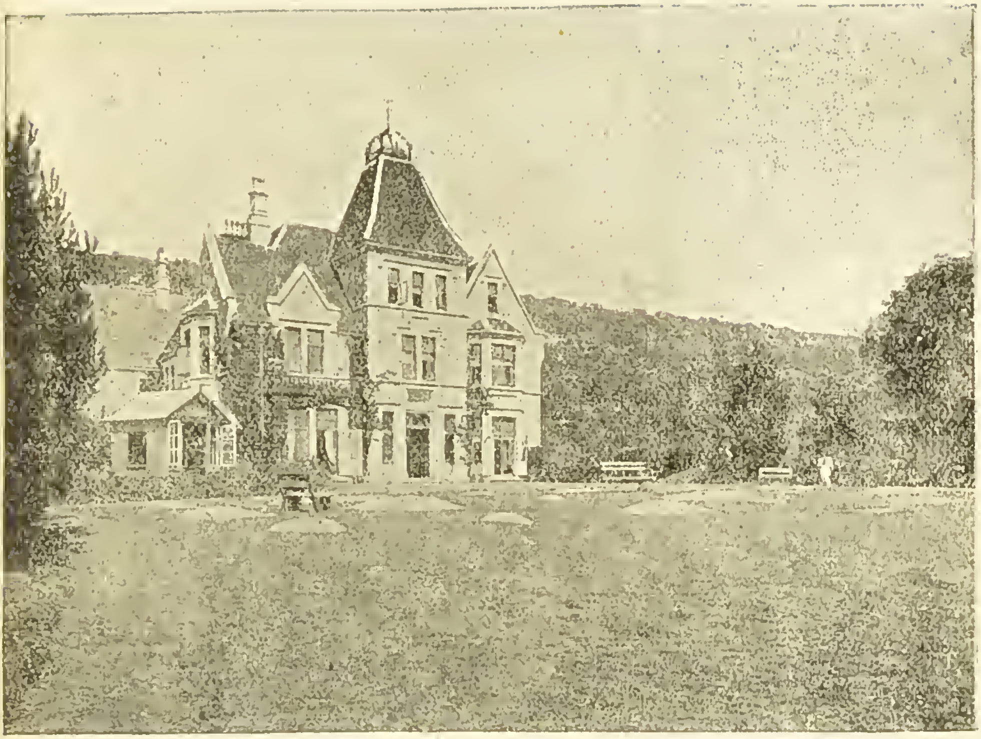
Registered Telegraphic Address :" SANATORIUM, FARNHAM."

MENDIP HILLS OPEN-AIR SANATORIUM

HILL GROVE, WELLS, SOMERSET.

Under the same management and medical supervision as Inglewood. Stands in its own grounds of 160 acres of fir and larch plantations at 850 feet above the sea level, rising to 1,000 feet in a few minutes. Miles of sheltered avenues of pine walks, lovely scenery, bracing atmosphere, electric light, etc. Inclusive terms, $3\frac{1}{2}$ to 5 guineas weekly.

Apply to the Secretary.



INGLEWOOD SANATORIUM.

OPEN-AIR TREATMENT OF CONSUMPTION.

Inglewood Private Sanatorium,

ST. LAWRENCE, ISLE OF WIGHT.

BEAUTIFULLY situated in 30 acres of park, forest, and undulating woodland on the south slope of a hill that rises at the back, about 800ft. above sea level, and well sheltered from north and north-east winds, commanding charming views of land and sea. The neighbourhood has the highest record of sunshine in the British Isles. Owner, who is experienced in open-air treatment, is Resident Physician. Utmost privacy, electric light, and heated by hot-water pipes.

INCLUSIVE TERMS: 3½ to 5 guineas. Apply Secretary.

This being a small private Sanatorium, it is possible to give special attention to each patient.

As we stand high, and the weather is bracing, patients are treated in the summer as well as in the winter.

AN INVALUABLE AID AND ASSISTANCE IN MEDICAL PRACTICE.

Indispensable in every case of Weakness or Retrogression arising from Malnutrition or Non-Assimilation of ordinary Invalid Diet.

UNSURPASSED FOR KIDNEY TROUBLES.

A HIGHLY USEFUL ADJUNCT TO ALL PATIENTS' FOOD.

PRIDEAUX'S

CASUMEN

(REGISTERED).

The Pure Sterilised Essence of Fresh English Milk.

THE ONLY SOLUBLE MILK CASEIN.

Extracts from an Article in THE LANCET of July 20th, 1901, page 151:—

"This is an admirable product. . . . A special process eliminates milk proteid in a pure and soluble state. Practically tasteless, and keeps indefinitely. Our analysis shows no less than 93 per cent. of pure proteid. We have not examined a preparation containing so high a proportion of proteid . . . must possess extremely high food value. It readily peptonises and is therefore easily digestible. . . Useful towards raising the flesh-forming value of a number of foods. Could be added to soups, beef-tea, cocoa, and many other foods with undoubted dietetic gain. It is free from milk-sugar . . . decided advantage for diabetic patients. The flesh-forming constituent of a natural food. . . . A very powerful and concentrated form of nonrishment."

Detailed Prospectus (sent post free) contains full analytical Report by THE LANCET ; *a table of the remarkable food value of CASUMEN as compared with articles o every day diet ; directions for use, etc.*

Price (in boxes) 2lb., 4s. ; 1lb., 2s. ; ½lb., 1s. ; ¼lb., 6d. ; and 2 ozs., 3d. Half-pound Post Sample, 1s. Bulk in Bags, 1s. 6d. per pound.

Of Chemists, Stores, Grocers and Dairies, or direct from

PRIDEAUX'S Pure Casein and Life Food Co., Ltd

MOTCOMBE, DORSET, ENGLAND.

"SANITAS" OIL.

"I prescribe 'Sanitas' Oil daily, and reported favourably on its use to the Collective Investigation Committee (British Medical Association). I think very highly of it in all throat affections."—M.B., M.R.C.P.

"To breathe 'Sanitas' is to breathe health."

GORDON STABLES, C.M., M.D., R.N

LUNG AND THROAT AFFECTIONS.

All who suffer from LUNG and THROAT COMPLAINTS should bear in mind that the atmosphere of

PINE AND EUCALYPTUS FORESTS

can be secured at home (thus saving an expensive journey abroad) by the use of

"SANITAS" OIL.

"SANITAS" BRONCHITIS KETTLES.

2/6 Each. 2/6 Each.

"SANITAS" INHALERS,
1s. and 2s. 6d. each.

"SANITAS" OIL,
1s. and 4s. Bottles.

"SANITAS" EMBROCATION,
In 8d., 1s. and 2s. 6d. Bottles.

PAMPHLET FREE.

Of all Chemists, and the

"SANITAS" CO., LTD.,
BETHNAL GREEN, LONDON, E.;
and 636/642 W 55th Street, NEW YORK.

"SANITAS" SAWDUST SHOULD BE USED IN ALL "CUSPIDORS."

SALUTARIS

THE "IDEAL" TABLE WATER.

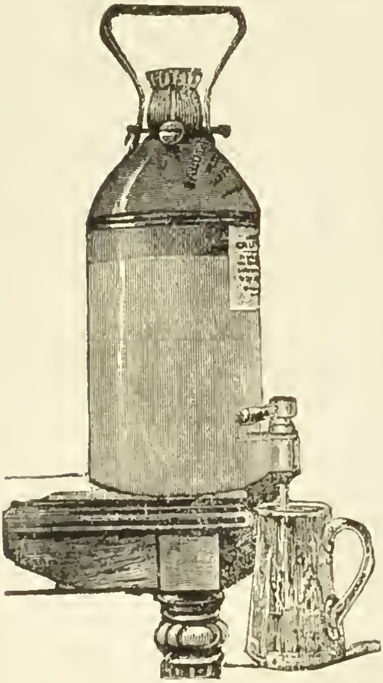
SALUTARIS is GUARANTEED to be a DISTILLED Water Aerated, manufactured with the most elaborate precautions to secure PERFECT HYGIENIC PURITY.

SALUTARIS is widely recommended by the Medical Profession as a TABLE WATER for DAILY USE on account of its absolute PURITY and its SOLVENT properties.

NET PRICES IN LONDON:—

Champagne Quarts	...	3/-	per Dozen.
Champagne Pints	...	1/9	Do.
Syphons	...	6/-	Do.

The price of Syphons includes all costs of Carriage throughout the United Kingdom.



N.B.—A champagne quart of Salutaris contains nearly THREE times as much as an ordinary large soda-water bottle, and is therefore far cheaper than the commonest and cheapest Soda Water.

"STILL" (i.e. non-aerated) **SALUTARIS** is supplied in one gallon jars with taps, and will be found useful in cases of DYSPEPSIA, especially with YOUNG CHILDREN.

Write for full Particulars to—

SALUTARIS WATER CO.,
236, Fulham Road,
- - LONDON.

BY ROYAL WARRANT
TO HIS MAJESTY
THE KING OF ITALY.

Hubbard's

Scotch Rusks

are highly recommended by the most eminent medical authorities, and are especially prescribed by them in cases where children require

A Light, Nourishing & Attractive Diet—and for Invalids.

Manufactured by WALTER HUBBARD,
PARTICK, GLASGOW.

Free Sample to any Medical Practitioner on receipt of Card.

DIET IN CONSUMPTION.

It is an axiom that a nutritive, easily assimilated tonic food is a necessity in treating all stages of

CONSUMPTION.

VINSIP *(Liq. Haemoglobin Co.)*

. . is Highly Nutritive.

3 ozs.	-	1s. 6d.
6 ozs.	-	2s. 6d.
12 ozs.	-	4s. 6d.

It throws no labour on the Digestive Organs.
It increases the Appetite.
It promotes the assimilation of other Food.
It gives tone to the System.
If diluted with cold water it is tasteless and is tolerated by the most capricious stomach.

VINSIP

is an invaluable food in ANÆMIA, and in all cases of MAL-NUTRITION, whether of Infants, Children, or Adults.

OF ALL CHEMISTS OR STORES.

Prepared by

VITALIA, LIMITED,
5, ALBION PLACE, BLACKFRIARS, S.E.

SOMATOSE

(MADE FROM BEEF).

"The most powerful food known to science. A true Meat Nutrient, and is especially valuable in all cases of

FEVER, DYSENTERY, AND INFLUENZA."

Vide *Lancet* of Sept. 30th, 1899.

Is acknowledged by Eminent Medical Authorities at Home and Abroad to be

The Ideal Food for Invalids and Convalescents.

It is an almost tasteless and odourless powder.
It contains nearly 80 per cent. of Meat Albumen.
It acts directly as a tonic and creates an appetite.
It is not a drug, but a Therapeutic food.
It is easily soluble in Water, Milk, Soup, Coffee, Cocoa, etc.

SOMATOSE is also sold as a LIQUID, being a more convenient form of administration.

IRON SOMATOSE

Contains the tonic qualities of Iron, combined with the albuminous substance of Meat.
Causes no Gastric disturbance or Constipation.
Does not affect the Teeth.
Is a freely soluble preparation of Iron.

MILK SOMATOSE

Contains the albuminous matter of Milk, combined with 5 per cent. of Tannic Acid.
Is slightly astringent and non-irritant.
Is most suitable for strengthening weak digestive organs.
Is especially valuable for infants and children.

Now used in all the principal Civil and Military Hospitals and Asylums.

SOLD BY ALL CHEMISTS.

Full Particulars from
THE BRITISH SOMATOSE CO.,
LTD.,
165, Queen Victoria Street, London, E.C.

HEROIN HYDROCHLORIDE.

A MOST valuable substitute for Morphia, possessing in full the well-known **Sedative** action of Morphia, but is to be greatly preferred to it in all cases of Bronchitis, Asthma, Catarrh, and the

COUGH OF PHTHISIS,

as it not only acts as a **Sedative,** but also as an expectorant.

HEROIN HYDROCHLOR.

Can be had in a convenient form at Messrs. WYLEY'S, LTD., Coventry, as Pastilles, each containing 1-50th of a grain.

* * *

DUOTAL AND CREOSOTAL.

The most effective Creosote preparations for the

TREATMENT OF CONSUMPTION.

DUOTAL is a tasteless and odourless Carbonate of Guaiacol.

CREOSOTAL is a pleasant, syrup-like Carbonate of Creosote.

* * *

Full Particulars from

THE BAYER CO., Ltd.,

20, Booth Street, MANCHESTER.

Also at LONDON, BRADFORD and GLASGOW.

Joseph Turner & Co.'s

NEW SYNTHETIC REMEDIES,

SYNTHESIZED AND MANUFACTURED IN ENGLAND,

GUAIPEROL (GUAIACOLATE OF PIPERIDINE).

This remedy for phthisis, which combines the antiseptic properties of Guaiacol with the vascular tonic action of Piperidine, has been tried, with considerable success, at the London and other Chest Hospitals. It has not the irritant properties of Guaiacol, and possesses many advantages over the latter substance, and preparations of the same now on the market. Dose: From 10 grains twice a day, preferably in cachets, after meals.

See "British Medical Journal," January 16, 1897, and July 16, 1898, etc.

◆

ALSO MAKERS OF ERYTHROL TETRA NITRATE (VASO DILATOR), AND PIPERIDINE TARTRATE (URIC ACID SOLVENT).

◆

Sole Patentees and Manufacturers, from whom Samples and Literature may be obtained—

JOSEPH TURNER & Co., Ltd.,
QUEENSFERRY, FLINTSHIRE, N.W.

The Ideal Antiseptic and Disinfectant.

MEDICAL

NON-POISONOUS. IZAL. NON-CORROSIVE.

Does not coagulate albumen.
Does not oxidize.
1 in 200 destroys the Bacillus Coli in five minutes.
Definite germicidal power guaranteed. The percentage of active material present is constant.
Does not cause irritation.
Does not corrode instruments or injure the operator's hands.

FOR EXTERNAL USE.

Indicated in Eczema and Ringworm.
For Fresh Wounds, Ulcers, and Foul Wounds, Douching in Midwifery Practice, Washing Instruments, etc.
"Izal" (1 in 200) is absolutely innocuous for washing out large cavities. It has a very marked effect in reducing suppuration in granulating wounds.
Its non-irritating character is a marked advantage when employed in washing out a Peritoneal Abscess, a Foul Bladder, or a Stinking Sinus.

FOR INTERNAL USE.

Indicated in Chronic Dyspepsia, Fœtid Bronchitis, Foul Stomach, Diarrhœa, Dysentery, and Typhoid Fever, also in Phthisis. See "THE LANCET," Jan. 18th, and March 8th, 1902.

Verbatim Reports—Bacteriological, Pharmacological and Surgical—and Samples Free to the Profession.

NEWTON, CHAMBERS & CO., Ltd.,

THORNCLIFFE, near SHEFFIELD.